[COMMITTEE PRINT]

AIRPORT AND AIRCRAFT SAFETY RESEARCH AND TECHNOLOGY

REPORT

PREPARED BY THE

SUBCOMMITTEE ON
TRANSPORTATION, AVIATION AND MATERIALS

TRANSMITTED TO THE

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LETTER OF SUBMITTAL

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, D.C., October 1983.

Hon. DON FUQUA,
Chairman, Committee on Science and Technology,
U.S. House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: It is my pleasure to present to you the report of the Subcommittee on Transportation, Aviation and Materials concerning aviation safety research and technology, with particular emphasis on aircraft cabin fire safety, aircraft maintenance monitoring systems, and the technology of airport safety.

The report is based on hearings held June 27 and July 18, 1983, and presents findings and recommendations therein to support continued improvements in aviation safety through the application of research and technology.

DAN GLICKMAN,
Chairman, Subcommittee on Transportation,
Aviation and Materials.

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INTRODUCTION AND SUMMARY

The Subcommittee on Transportation, Aviation and Materials has had a long-standing interest in assuring the use to new technology to improve aviation safety. As the Subcommittee responsible for authorizing the research and development funding for the Federal Aviation Administration and the aeronautics programs of the National Aeronautics and Space Administration, it is in a unique position to determine appropriate applications of new technology and to assure its use to improve the safety of the Nation's aviation system.

Several aviation safety issues were considered by the Subcommittee on June 27, 1983, and July 18, 1983, and are the subjects of this report. Those issues include: aircraft cabin fire safety, aircraft maintenance surveillance systems, and airport safety technology. In particular, the Subcommittee focussed its attention on the development and use of new fire-resistant materials for aircraft cabins, the adequacy of the FAA's current aircraft maintenance surveillance systems, the relationships of technology to airport operations and certification standards (FAR Part 139), take-off and landing obstruction standards (FAR Part 77), particularly as they apply to Washington National Airport, runway friction research programs, and the general process of implementing the results of aviation safety research.

I. Aircraft Cabin Fire Safety

Aircraft fires continue to be a major factor in air carrier fatalities. According to the National Transportation Safety Board, about 20 percent of all air carrier crashes result in aircraft fires, and about 20 percent of the people who die in these crashes were not seriously injured in the impact itself, but died solely from the effects of fire and/or smoke. Since 1965, of the 914 fatalities in U.S. airline accidents involving fires, an estimated 80 percent were caused by fire, smoke, and toxic gases because passengers were unable to evacuate an aircraft in time to escape those hazards.

The FAA responded to some aspects of this problem in 1979 by establishing a Special Aviation Fire and Explosion Reduction (SAFER) Committee. The committee, made up of representatives from the FAA, NASA, and industry, made a number of recommendations, including new research methods for cabin material flammability tests, and the development of anti-misting fuels.

The Subcommittee on Transportation, Aviation and Materials has supported the improvement of cabin fire safety through the development of less-flammable aircraft cabin materials and has increased the funding levels for related FAA and NASA research programs. The most pressing concern of the subcommittee has been the development of less flammable materials for aircraft seats be-

cause previous tests have indicated that seat cushions, designed to provide buoyancy for passengers in an over-water crash, were significant contributors to the spread of an aircraft fire.

The FAA, with the assistance of NASA, has made progress in the last few years on the development of fire resistant materials for aircraft seats. This technology, the results of the FAA fire blocking layer research, relies on slow-burning seat covers placed over aircraft seat cushions to lengthen the time available for passengers to evacuate a burning aircraft. The Subcommittee on Transportation, Aviation and Materials and the Subcommittee on Investigations and Oversight recommended that the FAA strengthen their flammability standards in order to take advantage of this technology following hearings in March of 1982.

Following the tragedy of the Air Canada in-flight fire, the Subcommittee decided to renew its recommendation to the FAA. In response to the Subcommittee's request, FAA Administrator J. Lynn Helms announced at the June 27, 1983, hearing that he would propose new regulations to implement the results of their fire blocking layer research. The Notice of Proposed Rulemaking was published in the Federal Register on October 11, 1983. It is estimated that it will take the airline industry 1-2 years to retrofit their fleets once the rule is finalized.

Fire blocking layer technology had been available for several years and could have been implemented by rulemaking procedures earlier than the current plan anticipates. Thus, the Subcommittee continues to be concerned about the time lag between FAA research and development programs and the ultimate regulatory implementation of new lifesaving technologies due to the excessively deliberative actions of the FAA, DOT, and OMB.

The FAA is currently working on the development of less flammable aircraft cabin wall, ceiling, and floor materials. In addition, the FAA is continuing research on an anti-misting fuel known as AMK (Anti-Misting Kerosene). AMK employs an anti-misting additive of high molecular polymers which reduces the formation of highly flammable fine fuel mists when fuel is released from a damaged airplane at high decelerative forces. It is the hope of the Subcommittee that these research programs will not be self-perpetuating, but will quickly be developed into lifesaving standards.

II. Aircraft Maintenance

The safety of commercial aviation is dependent on a number of factors, and particularly on proper aircraft maintenance. During the first half of 1983, the usually large number of aircraft incidents or near-accidents involving engine failures, damaged or disabled engines, and zero-fuel emergency landings, coupled with the overall poor financial condition of many previously healthy airlines, resulted in increased aircraft maintenance monitoring activities by the Federal Aviation Administration. Given the complexities of modern aircraft design and the millions of aircraft operations each year, this is a formidable task.

In an attempt to assure the highest level of safe operations throughout the service life of an aircraft, the Federal Aviation Administration has developed comprehensive aircraft maintenance

surveillance programs. An integral part of this system is the continued monitoring of problems encountered by an aircraft as it ages, the identification of problem origin, and the institution of corrective actions before they result in an incident or accident. This effort is implemented, in large degree, through the FAA's Service Difficulty Reporting System (SDR). Under the Service Difficulty Reporting System, an aircraft operator is required to submit a daily report to the FAA maintenance inspector assigned to its operations describing the occurrence or detection of any failures, malfunctions or defects as defined in the regulations. The aircraft manufacturer and authorized repair stations are subject to similar reporting systems. The FAA collects these reports, analyzes them for trends, and disseminates the SDR's throughout the country.

In order to better cope with the magnitude and complexity of this task, the FAA plans to improve the efficiency of the current system by incorporating it into a highly automated Aviation Safety Analysis System (ASAS).

III. Airport Safety Technology

In response to concerns about airport safety identified by user experience and accident investigation (over 50 percent of all civil aviation accidents occur at or near airports) Congress enacted the Airport and Airway Development Act of 1970. This legislation authorized the FAA to certificate airports serving air carriers and establish minimum safety standards for airport operation. Airport certification was an extension of the FAA's existing mandate, to certificate airmen, aircraft, and air carrier operations; to inspect air carrier maintenance; to determine suitability of air navigation facilities; and to ensure the safe and efficient use of airspace.

Part 139 of the Federal Aviation Regulations, developed and promulgated in response to the Airport and Airway Development Act of 1970, governs the certification and operation of airports serving air carriers. The requirements address a wide range of airport facilities, physical features, services, and operating procedures which are critical to safe aircraft operation.

In 1975, three years after the adoption of Part 139, the General Accounting Office (GAO) reviewed the FAA's Airport Certification Program. The GAO, while acknowledging the improvements in airport safety due to certification, called upon the FAA to reevaluate the basis for its airport safety standards and the effect of exemptions; to set standards for measuring runway friction, and to make airport standards more specific. The National Transportation Safety Board has also recommended that the FAA incorporate runway traction test requirements in aviation regulations.

The National Transportation Safety Board is currently conducting a study to develop an overview of airport management and operational policies, FAA certification and surveillance programs, and air carrier operational considerations to determine whether new technology and the modern operating environment warrant modification of the 1972 FAR Part 139 standards.

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FINDINGS AND RECOMMENDATIONS

I. Aircraft Cabin Fire Safety

The Subcommittee finds that the Federal Aviation Administration's research programs have not resulted in the expeditious implementation of improved safety standards, particularly in the area of aircraft cabin safety. The Subcommittee recommends that the FAA expedite its cooperative research programs with NASA to develop anti-misting fuels and fire resistant materials for aircraft cabin walls, floors and ceilings, and to take the necessary actions to strengthen regulatory standards in these areas as quickly as possible.

The Subcommittee finds that the recent actions of the FAA in issuing notices of proposed rulemaking for the introduction of fire-resistant materials for aircraft seats, for additional emergency exit lighting in aircraft cabins, and the technical standard for protective breathing equipment for aircraft crewmembers are consistant with previous recommendations of the Subcommittee. The Subcommittee recommends continued action to assure expeditious retrofitting of airliners with this equipment. The Subcommittee further recommends that the FAA propose rulemaking to require smoke detectors in aircraft lavatories.

The Subcommittee finds that recent air carrier accidents clearly indicate that many lives could be saved by a more expeditious implementation of the results of FAA aviation safety research programs. The Subcommittee recommends that the FAA, DOT and OMB streamline their regulatory review process in order to expedite the implementation of new lifesaving technologies through the rulemaking process.

II. Aircraft Maintenance

The Subcommittee finds that the current poor financial condition of some air carriers due to many factors, including the dislocations of deregulation, may result in the reduction of the extra margin of aircraft maintenance and safety that airlines have previously provided. The Subcommittee recommends that the FAA enhance its attention toward maintenance surveillance activities as the airlines adjust to the dislocations in the market.

The Subcommittee finds that the FAA's Service Difficulty Reporting System could be substantially improved by several procedural changes. The Subcommittee recommends that the FAA change its Service Difficulty Reporting System to assure that all in-flight aircraft engine shutdowns are required to be reported, and to assure that "major" and "minor" repair categories accurately characterize the nature of the required repair activity.

The Subcommittee finds that the FAA's current aircraft maintenance surveillance programs need to be modernized and automated. The Subcommittee supports the FAA's program to develop the Aviation Safety Analysis System.

III. Airport Safety Technology

The Subcommittee finds that current FAA airport operations and certification standards (FAR Part 139) may not have kept pace with recent improvements in airport safety technology, and is particularly concerned about the limited authority of the FAA to influence decisions to construct buildings which may be obstructions or hazards to air navigation near airports under FAR Part 77 standards. The Subcommittee recommends that the FAA and the NTSB place greater emphasis on their review of FAR Part 139 and FAR Part 77 standards to determine the feasibility of making Federal Aviation Regulations more specific in order to take advantage of new technologies such as low level wind shear alert systems, runway friction measurement systems, microwave landing systems and others. Such reviews should include a comparison of the various operating procedures under FAR Part 139 at all major commercial airports.

The Subcommittee finds that the approach procedures to runway 18 at Washington National Airport could be improved. The Subcommittee recommends that the FAA reconsider the recommendations of the National Transportation Safety Board (A-83-27, 28, 29 and 30) on March 24, 1983, to change the position or add an additional ARTS-3 antenna used for the minimum safe altitude warning system, and to realign the runway 18 approach closer to the Potomac River.

IV. Aviation Safety Research Programs

The Subcommittee finds that the FAA's aviation safety programs do not seem to be subjected to the continuing evaluation necessary to determine if they should be continued or discontinued, or evaluated to determine if the research results are sufficient to justify immediate regulatory proposals. The Subcommittee further finds that it takes public and congressional pressure, or the unfortunate loss of life in an air carrier accident such as the Air Florida accident at Washington National (deicing), the PanAm accident at New Orleans (wind shear), the World Airways accident at Boston Logan (runway friction) or the Air Canada in-flight fire (cabin fire safety) to get the FAA, DOT and OMB to bridge the gap between research activities and the implementation of lifesaving equipment through regulatory actions. The Subcommittee strongly recommends that the FAA reaffirm that the purpose of its research programs is to provide timely and practical improvements to the safety of the flying public, not to continue indefinitely with scientific and academic exercises.

The Subcommittee finds that the FAA has made significant advances in aviation safety technology through cooperative research programs with NASA and the aviation industry, but continues to lag with the implementation of those technologies. The Subcommittee recommends continued congressional support for the FAA's avi-

ation safety research programs while placing greater emphasis on pressing the FAA for more timely introduction of lifesaving technology through upgraded regulatory standards.

SUMMARY OF TESTIMONY BY ISSUE

I. Aircraft Cabin Fire Safety

Mr. Jim Burnett, Chairman of the National Transportation Safety Board, outlined recommendations that the NTSB has made with regard to aircraft cabin fire safety:

Mr. Burnett. We have made numerous recommendations, Mr. Chairman. Among them are recommendations to improve their standards for flammability, or to decrease the flammability of materials used in aircraft, including seat covers and paneling materials. We have made recommendations for smoke detectors in lavatories. We have made recommendation for self-contained breathing apparatus so that flight attendants would be able to enter an area that might be obscured in smoke to be able to directly use fire extinguishers directly on the base of the flame.

We have been very concerned, although I don't know that we have a formal recommendation on it, we have certainly in rulemaking proposals commented on the need for addressing the toxicity of materials that were being used in aircraft interiors. We have supported efforts to install the fire resistant windows so that the exterior fires could be restricted until there is adequate time for evacuation.

We have favored the development, as I mentioned, of the fire blocking seat cover materials which we believe the FAA now has technology that is not only adequate from the technical standpoint, but from the economic and the weight standpoint and the wear standpoint, from the comfort standpoint, to require in aircraft as they are constructed or retrofitted. Those are some examples of the recommendations we made.

Mr. Glickman. I am sure you are aware that the FAA has been conducting research for quite awhile on the issues of flammability, toxicity. This subcommittee has jurisdiction over some of those areas. Much of that has been done at the technical center in Atlantic City. Do you think that there is any reason now why the FAA should not upgrade their flammability standards?

Mr. Burnett. No.

Congressman William Carney asked Mr. Burnett to elaborate on the issues of aircraft cabin fire safety:

Mr. Burnett. I think you have to look at it issue by issue. Many of the recommendations the NTSB has made have been of longstanding and there have been substantial changes in technology since we first made them. The Board again has been very patient, perhaps too patient, with the FAA in rating those—their response to those recommendations as acceptable pending further research.

In the area, for instance of fire blocking material on seats, I think, and I believe the industry sees this, that all has been done that needs to be done to implement that. Not only from the techni-

cal research standpoint but from research on the economy and feasibility, the comfort and those issues. So we are ready to move on that. Any further delay is inexcusable as far as I am concerned. One thing we have not mentioned that I certainly do not want to leave this table without mentioning is the NTSB's recommendations about improving lighting for evacuation purposes. If people cannot find their way out, regardless of the time that you buy them with fire blocking seat materials, it is not going to achieve anything. It doesn't seem to me to be technically unfeasible that we also put exit lights and markers for emergency evacuation purposes at least at the armrest level.

The Honorable J. Lynn Helms, Administrator of the Federal Aviation Administration outlined the evolution of the FAA's aviation safety research programs:

Mr. HELMS. In the spring of 1981, I laid out for the FAA four long-term programs and plans going to the end of the century. The first was the national air space system plan, which had to do with equipment. The second was the national air space review. How do we more properly use this cubic volume of air over the earth? Third was a system of integrated airports to improve the capacity and uses of airports. Fourth was an advanced R&D program leading to the support of the first three, identifying those other problem areas which should be pursued. Within that R&D program, then, it is broken down into numerous sections of which one section is cabin safety.

Cabin safety then is broken down into the six elements which I have identified on this chart so that members of the committee could see that today we are talking one segment of one portion of the R&D program, which is one of four major plans for the FAA. This plan is laid out on the basis of crashworthiness; antimisting kerosene; interiors; what we refer to as the control impact will be a combination of many other items; evacuation; finally, the supporting systems.

(1) FIRE BLOCKING LAYER RESEARCH

FAA Administrator Helms reviewed the fire blocking layer program:

Mr. HELMS. Blocking layer data has finally come through. I have gotten the last data in May of this year, 30 days ago. So I now have, finally, the last data which I need to be able to make a decision on this. That is not true for the panels inside. That will take nearly another year.

Mr. GLICKMAN. That is true for the seats you are talking about?

Mr. HELMS. Yes, sir, just for the seat blocking layers. If you take the urethane pads within there which gives the buoyancy for the people to be able to float in water, when it burns it is going to convert into hydrogen chloride, that is an irritant. Now then will the blocking layers hold down the irritant and at the same time reduce the smoke content? The answer is yes.

We now have the final data and we do have a design of a material that we are ready to have put into production for the blocking layers which will both regard fire, retard smoke and, in fact,

achieve what we have been after. Solely for the seat, though, not the carpets and inside panels as yet.

Mr. GLICKMAN. Do you propose rulemaking, then, for the seats?

Mr. HELMS. I expect to take rulemaking action within the next 30 days, Mr. Chairman. That is the month we set aside in May of 1981 when we laid out this long-term program.

Mr. GLICKMAN. Yes. So what you are basically saying is you will propose your rulemaking sometime next month, then?

Mr. HELMS. Yes, sir, within the next 30 days I expect to take rulemaking action.

Mr. GLICKMAN. For seats. Now what about the other issue you talked about, you are not ready for rulemaking then on the panels?

Mr. HELMS. The panels themselves. No, sir. Not on the panels as yet. We do not have the same problem and we don't have the same capability to put blocking layers there. In addition the panels have different structural loads put on them. We will start the first of our full demonstration fire test tomorrow at the tech center in which we will establish what we call a baseline, Now, that we have seat blocking layers, we have seats that can be put in and we have carpet configuration.

We will start the first fire test tomorrow at the test center in which we will measure the temperature, toxic irritant gases, smoke, temperature, all those items. From that we will go into a program of, I think there are slightly over 200 panels of eight different chemical combinations in which we will take these panels, some as long as 96 inches, some as small as 12 by 25, and substitute this into this modeling and conduct fire tests. This will take us a year.

Mr. GLICKMAN. So right now do you have any idea on timing for possible rulemaking on the fire blocking materials, non-seat related? A year?

Mr. HELMS. I wouldn't refer to it as fire blocking. I think we would say improved fire retardant panels. My current schedule calls for late 1984. I have no reason to believe I am not going to make it.

Mr. GLICKMAN. What about the issue of less flammable windows?

Mr. HELMS. We have demonstrated less flammable windows. In fact, we get about a 400 percent improvement. What has not been demonstrated is their capability to stand temperature cycling between going up to high altitude at minus 65, coming down in the desert at 110. We do not yet know what the fatigue cycling and reliability of the windows are.

In addition, there seems to be some slight difference in the expansion ratio of that material to the metal frame around it. Therefore, we may induce metal fatigue failure. Of course they are hairline but that is all it takes. So, yes, we do have a material which has significant improvement of windows which will serve to improve it, but we just have some more work to do on that.

(2) SMOKE DETECTORS

Congressman Glickman asked Administrator Helms about smoke detectors in aircraft lavatories:

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Mr. GLICKMAN. Why are there no FAA requirements for smoke detectors in airplane lavatories?

Mr. HELMS. NTSB originally recommended this. We took the approach of let us prevent the fire and contain it rather than to depend solely on alarming someone. The alarm device itself may fail. So, first we restricted smoking in lavatories. Secondly, we constructed and required, it is part of the Federal air regulations, that the interior of all of these containers must be fireproof. So that if a fire starts in there, and incidentally that is the reason why when you drop your paper towel or something you must push on it, it is spring-loaded up. Those are designed so if there is a fire in there that they will burn themselves out and be contained within that. So we took the approach of making it illegal since it is a violation of regulations to smoke there. Additional to that certain carriers do install fire detectors and automatic dispersal units.

But we have researched our records going back to the introduction of jet aircraft. There is not one case on record since jet aircraft were put into service in the United States that a passenger has lost his life due to an in-flight fire. That is not a bad record. So when we go back and look at this, we are not able to substantiate a problem. No U.S. crew has ever had a fatality due to a fire in flight in jet aircraft. So something must be right without that.

(3) FLASHOVER

Congressman Glickman and Administrator Helms discussed aircraft fires and the problem of "flashover" when a fire totally engulfs an aircraft cabin:

Mr. GLICKMAN. You know when we talk about the issue of fire and flammability, seats are part of the problem.

Mr. HELMS. Yes, sir.

Mr. GLICKMAN. You talked about other parts of the airplane, though, that can and would burn. How significant a part of the problem will be remedied by fire resistant material in seats?

Mr. HELMS. By far the majority. Seats are by far the largest contributor to the fire problem. Further, it is the flashover that is the significant item. When we started these tests three years ago we really didn't know what this phenomena of flashover was, Mr. Chairman. The best minds in the country sat down to take a look at it and assumed that under a normal burning situation you would have an increase in temperature, increase in smoke and toxic fumes, increase in irritant gases. But no one thought it would go in a given level and given set of conditions within seconds, and I maen seconds, 1 to 2 seconds.

You would see this flashover situation occur in which it no longer is survivable. Once we found this, this is part of the problem, our critics said you have known this for a long time. We did not know about flashover and how to prevent flashover. That is what we have been working on. If we can delay the point of flashover, you have now established the greatest single contributor to the presevation of life. That is by far the most significant for the airplane on the ground.

First, eliminate flashover, then get out of the aircraft as fast as possible.

Mr. GLICKMAN. Will your proposed regulations call for retrofitting existing seats?

Mr. HELMS. Yes, Mr Chairman, we will have a retrofit scheduling.

Mr. GLICKMAN. One of your staff, or perhaps NTSB, indicated they do retrofitting as a matter of course anyway.

Mr. HELMS. Yes, sir, I said two years . I think if you plot it out on a curve you will see it is closer to three years, but the difference is not that much. About every three years it is a routine update by carriers, and they do in fact implement new interiors.

Mr. GLICKMAN. Do you expect airline resistance from this proposed regulation?

Mr. HELMS. Yes, sir. Not in the interest of safety but in the interest of the schedule that we implemented. I suspect they are going to want longer.

Mr. GLICKMAN. I would just encourage you to indicate your safety concern, which you have in your hearing today and previously, and move ahead as expeditiously as possible, because I think the flying public will want to know fire resistant seats are in the airplanes they are flying in. Once they know the materials are available, they won't believe there will be much excuse for delay.

Mr. HELMS. That is the reason that now that I have the data we are now looking at the manufacturer's schedule to see what can be done, when we can get it.

We want multiple sources, and that is the reason for the delay from May until this month. But I will make it by July.

Mr. GLICKMAN. Finally, I would ask you, some have criticized you for spending years and years of researching things, and it took an accident fire in an airplane in order to expedite you to move towards the rulemaking on cabin fire safety. I wonder if you might comment.

Mr. HELMS. I am sure the chairman refers to the Air Canada accident in Cincinnati. It had absolutely nothing to do with it. My internal schedule laid out early in 1981 specified a target date of July this year. On three items I reviewed in March and April of this year relating to cabin safety I have made decisions then on dates, seat blocking material is one of them. It had no impact on us at all.

I am certainly regretful of any aviation tragedy but testing is successful only when it meets two criteria. It meets the end objective. And it does not create a worse, alternate problem. It is the latter that takes so much time. So many times, yes, we have a technical solution but it creates a worse, alternate problem. Therefore, we have to continue to go.

Mr. CARNEY. Mr. Helms, you laid out much of that schedule to this committee back in 1981. I would just want to say that for the record. I indeed believe certainly that you could not make standards in the time frame from when the Cincinnati accident happened to when you project you will be announcing them within the next 30 days.

Mr. HELMS. I would be remiss, Mr. Carney, if I did not compliment the committee because when I laid out the program in 1982 we had $80.8 million of R&D funds. The committee provided over a 50 percent increase. We went to $121.2 million in 1983. I laid out what I wanted for 1984 to the committee, and it was more than

doubled to some $280 million and the committee supported that. So the progress we have made is basically because of two items. We laid out a good sound detailed systems engineer plan in early 1981, and this committee supported it.

(4) ANTI-MISTING FUEL (AMK)

Congressman Carney and Administrator Helms discussed the status of the FAA's anti-misting fuel research programs:

Mr. CARNEY. You are looking at two thrusts if I remember correctly. Your two primary thrusts would have been cabin safety and that fuels problem, because historically, fires are caused by the crash. I can remember seeing the film that you showed where if you could hold down the misting, the plane would leave the fire.

Mr. HELMS. Yes, sir.

Mr. CARNEY. It would ride right through the fire. That is something that interested me then. It interests me now. You gave a great description as to the problems associated with those types of fuels, the antimisting fuels. Could you give us an idea of when you might have available to the industry a type of fuel that would have the properties you are seeking?

Mr. HELMS. I believe we have achieved the chemical formula we need, very slight additions. What we refer to as FM-9 now we have been able to modify in these tests the last six months. So we are very close to that. Now the question is how do we get this into the infrastructure in such a way that we can have reliability? How many fuel pumps will have to be changed; that is, tank trucks, throughout how many airports, because unless we make this an additive or formula or unless we make it something which can be used, it has little value. So my judgment is by late next year, late 1984, I am going to be in a position to at that time have sufficient confidence to make rulemaking action.

But I want to introduce a word of caution now on this one. Until we see a little bit more about the effects of temperature soak, vibration. I don't know if these molecules will stay together under vibration. Boeing is running this through. GE is designing and building a degrader. This is the item that will take that fuel just before it goes to the engine, put it under pressure and now break those molecules apart so the fuel will burn in the engine. My confidence is pretty high, though. We have had good luck. I am going to shoot for late 1984.

(5) NASA RESEARCH

Dr. Raymond Colladay, Deputy Associate Administrator of the National Aeronautics and Space Administration and Mr. Allan Tobiason, Aviation Safety Technology Program Manager for the National Aeronautics and Space Administration outlined the results of NASA's fire safety research program:

Mr COLLADAY. I would like to focus on the main aspects of cabin fire safety that NASA in cooperation with the FAA and industry has pursued. We believe this has make possible elimination of a major fire hazard, that associated with rapid combustion of seat cushions. Seat cushions have been identified as the greatest single source of fuel for cabin fires. Under a NASA/FAA agreement with,

and FAA funding support, NASA Ames Research Center together with the airframe materials and chemical companies, evaluated the effectiveness of various fire blocking materials for use as seat cushion covers as a means of breaking the fire chain.

We have completed small scale and full scale fire and durability tests using the unique facilities at Ames and Douglas and Boeing. Selected configurations were then tested in the typical airline installations with various internal fire threats using the FAA C–133 full scale fire facility at Atlantic City. Our part of the research was completed last winter. The results were very impressive, as Mr. Helms has indicated, the use of fire blocking seatcovers even in conventional nonfire retardent cushion foams can dramatically extend evacuation times and survivability without significant weight penalty.

In fact, the FAA technical center C–133 tests demonstrated these seats would self-extinguish when ignition sources were self-consumed. These research results and those of subsequent FAA-recommended intermediate scale testing are being published and considered for implementation by the FAA in rulemaking and within the next 30 days as we just learned.

Although NASA has completed its support effort on these fire blocking seat cushion covers, as the industry continues to pursue more effective materials and evaluates them against forthcoming FAA standards and criteria, we will certainly assist where we can be of help. In fact, in a related cooperative effort between DOD and NASA, the Ames Research Center has discussed this fire blocking layer technology with the Air Force and Lockheed for use in a C–5 transport aircraft.

Despite these encouraging developments, however, as was pointed out, the post-crash fire problem doesn't end with removal of the seat cushion from the fire chain. Similar research needs to be done, and is in fact underway in a cooperative between FAA and NASA, to investigate interior wall, ceiling and floor planels. NASA and the FAA have a joint program to evaluate various panels both in service and advanced designs in the FCC C–130 under various simulated fire threats.

The program goal is to determine the incremental improvements in occupant survivability and egress time associated with improved panel materials used in combination with fire block seats. NASA is now completing delivery of typical in-service advanced panels for these C–133 tests scheduled to begin this summer. A forthcoming NASA Ames Tech Center agreement will define a similar new task to be completed by September of 1984 to meet the schedule Mr. Helms has laid out for the panel rulemaking in which in those tests NASA and industry will fabricate small scale and full scale panels using graphite fibers as a weight savings on the order of 20 percent relative to the current fiberglass based panel facings.

There are several other NASA/FAA cooperative cabin material fire safety research programs that I would like to briefly mention.

Fire resistant cabin windows developed by government/industry were tested on a one quarter scale facility. The use of intermediate epoxy polycarbonate lamination resulted in more than a fourfold increase in the time required for the fire to penetrate a window, making the window panel virtually as fire resistant as the fusilage.

Other considerations such as pressure cycling, maintenance, ultraviolet light exposure, differential expansion and mounting of the windows has to be examined, again as Mr. Helms pointed out.

Fire safety research at Johnson Space Center also supported the fire blocking layer technology development as well as fusilage turn through testing and advanced cabin floor panel research. Two JSC Boeing graphite floor panels are being evaluated over a three-year period for maintainability on a Boeing 727. The SAFER Committee and your August 1982 report of the combined subcommittees concluded that antimisting kerosene has the greatest potential for reducing post-crash fire risk by eliminating the fuel-fed external fire. That was pointed out in some detail by Mr. Helms this morning.

I won't go into any more detail other than to say that in a joint effort between NASA Lewis, our Propulsion Center, and Pratt-Whitney, we have been working with the FAA in identifying the performance of engine configurations using the AMK additive.

In closing, I would just like to say NASA has participated closely with the FAA and other government agencies and industry in safety research to develop both near and long term practical solutions. Improved fireworthy materials research has been a complex subject, but it has progressed rapidly because of the commitments on the part of the government including this subcommittee, and because of similar commitments by the aviation industry, and concern on the part of the traveling public.

We now have an opportunity to implement the results of the research in the form of fire blocking seat cushions with immediate rulemaking, and further downstream in the not too distant future on advanced panel technology.

Mr. GLICKMAN. You indicated the fire blocking layer research program has been successful and that the use of these fire blocking seatcovers has made possible elimination of a major fire hazard, aircraft seat cushions. Do you believe the FAA now has all the information that it needs to upgrade their current cabin material flammability standards for seats?

Mr. COLLADAY. Yes, Mr. Chairman, I do. I feel the technology base is in place on the seat blocking layer technology.

Mr. GLICKMAN. And do you think the airlines and aircraft manufacturers are aware of the effectiveness of these fire blocking materials for seats?

Mr. COLLADAY. Yes, sir, I do. They have been participating with us both formally and informally in workshops and technical briefings so that they have been aware of the research results, and they do understand the capability of these blocking layers.

Mr. GLICKMAN. Is there a weight penalty associated with these new seat materials?

Mr. COLLADAY. A very slight weight penalty, but not substantial.

Mr. TOBIASON. When you look at the optimized layer, Mr. Chairman, the weight penalty is virtually zero, especially when you take a fire retardant additive out and substitute the blocking part, there is essentially no weight difference in the seat itself.

Mr. CARNEY. How long will that fire-blocking material perform before you do have the flashover?

Mr. TOBIASON. The best information we have, of course, is the full scale C-133 work at the Tech Center. If one were to use a

normal urethane seat, you would say that flashover occurs after a minute and a half. With the fire-blocking layer, you are buying at least amother 45 to perhaps 50 seconds additional time, about a 60 percent increase in flashover resistance; or egress time, most importantly.

Mr. CARNEY. You are talking about adding 45 seconds to a minute of egress time before the flash occurs?

Mr. TOBIASON. To a minute and a half.

Mr. GLICKMAN. Can you estimate what the timing can be with accelerated effort to arrive at a material specification, process specs, manufacturing, regulation, standards, and four or five different things, one, fire-blocking seat materials?

Mr. TOBIASON. I think it is safety to say the technical information has been made available. FAA has come up with a test procedure that can relate small and intermediate scale tests with a full C–133 test.

Mr. GLICKMAN. What about self-extinguishing carbon firewall and furnishings materials?

Mr. TOBIASON. We will under the agreement with the FAA deliver the most advanced panels next year. A year from now we will have delivered the most exotic lightweight materials that can be tested starting a year from now.

Mr. GLICKMAN. Cabin floor burn through resistant materials?

Mr. TOBIASON. I think the floor burn problem has essentially been determined. FAA has that data.

Mr. GLICKMAN. What about antimisting fuels?

Mr. TOBIASON. NASA, we have completed our work. Our dedicated work to the FAA with respect to indentifying what do you have to do to jet engines to modify them to be compatible with FM–9 based AMK. Only FM–9. That is reported out this month.

Mr. GLICKMAN. Form NASA's perspective what else could we be doing?

Mr. TOBIASON. I think the fire-blocking layer concept, of course, is something we can look at within the wall panels themselves between the wall and outside skin of the airplane. I think we have to look at the insulation, bagging, insulation of wiring, wiring, fire barriers within walls you might say.

Mr. GLICKMAN. Thank you. We appreciate the work NASA has been doing in cooperation with the FAA on air safety. I happen to believe NASA's program is one of the shining lights of R&D programs that this country has. We appreciate the role you are doing to help move aviation safety along.

Mr. John E. Ralph, Senior Vice President for Operations & Technical Support, for the Transport Association of America discussed the use of fire-blocking layer seat materials with Congressman Dan Glickman:

Mr. GLICKMAN. How long would it take the air carrier fleet to install new, less flammable fire-blocking layer seat materials?

Mr. RALPH. I can't give you a definitive answer on that. The materials are available. Both FAA and NTSB have made that clear today. We are pleased that that is the case. Specialty vendor manufacturers are going to have to make use of those materials, to in fact design the seat, the production of the materials will have to get underway. I am not well-informed on the ability of the various

specialty manufacturers to provide a quantity. Just among ATA members alone we have about 400,000 seats in our inventory. So we are not talking about an easy task to do in terms of simply accommodating that large number; so we are very much concerned.

We look forward to seeing what the proposed rule would be. Our only concern is that it is cast in terms of something that is realistically doable in terms of the industrial process that will have to be undertaken to accomplish this.

Mr. GLICKMAN. But you are not going to fight the implementation of some rule which would require that fire resistant seats be put in aircraft, are you?

Mr. RALPH. Let me preface my remarks by saying that the aviation community was a strong supporter of the SAFER Committee actions that have already been referenced by the NASA witness. Specifically, on the fire blocking seat material we were a party to those recommendations. I would expect the concern of the industry will only be on its doability, and not any other consideration.

I can assure this committee that when there is a proved safety improvement based upon the evidence that is available, the airlines will support that information.

Mr. GLICKMAN. Thank you, General, very much.

II. AIRCRAFT MAINTENANCE

Congressman Dan Glickman, Chairman of the Subcommittee on Transportation, Aviation and Materials, outlined the purpose of the hearing and the concerns of the subcommittee:

Mr. GLICKMAN. During the last several months there have been a number of incidents involving major airline aircraft, and one serious in-flight fire which resulted in the deaths of 23 individuals. By my count there have been about 20 such incidents, many of which may be related to aircraft maintenance problems. The examples that received the most attention included:

—April 4th—Republic DC–9 fuel-starvation flameout north Bryce, Utah.

—May 5th—Eastern L–1011 emergency landing at Miami with all engines disabled or damaged by oil starvation.

—May 28th—Republic DC–9 zero-fuel emergency landing at Luke Air Force Base in Arizona.

—June 13th—United 727 engine failure after takeoff from Washington National Airport.

—June 11th—United 727 aborts takeoff at Chicago after engine failure and reports of engine fire.

In addition to these incidents, the Air Canada in-flight fire near Cincinnati vividly illustrated how quickly an aircraft emergency can turn to tragedy.

These issues that we are going to discuss today raise two larger, more general questions: In the unprofitability of the airline industry in general contributing to this perceived increase in near accidents, or are these incidents the inevitable consequence of human errors? The technology is available to improve the safety of aircraft, but is the money available to buy this technology?

Congressman William Carney, ranking minority member of the Subcommittee commented on the purpose of the hearing:

Mr. CARNEY. Mr. Chairman, I look forward to this hearing. We must realize that aircraft travel in the United States is the safest mode of travel there is in the world. We look at it to be 13 times more safe than it would be to ride in a car. However, we do see a trend, that the chairman spoke of in his opening statement, of many near misses, some accidents, some which have led to fatalities, and I think certainly this trend would deserve close scrutiny by this committee.

I look forward to the witnesses who will testify today to find out the answer to some of those quesitons. Indeed, is it just a matter of coincidence that so many mishaps or near mishaps have happened in a short time frame, or indeed is there something going afoul? Is it the age of the equipment, or perhaps the fact that the industry is becoming lax in its safety requirements and in its everday approach to safety in the airline industry?

Congressman Glickman questioned Mr. Jim Burnett, Chairman of the National Transportation Safety Board about recent aircraft incidents:

Mr. GLICKMAN. In the last several months there have been a number of aircraft incidents, or near incidents, some of which I mentioned in my opening statement. Has the NTSB looked at these trends to determine if they represent an unusually high number of near incidents?

Mr. BURNETT. Certainly we have probably investigated more incidents in the first six months of this year than we do ordinarily. I think the record for any year is about 27 incidents being investigated. We have maybe had 20 already. But if you look at the year in which they had 27, 20 of them occurred in the last six months. So the streak that we are experiencing is not unprecedented, and I see no reason at this time to believe that it is anything more than a streak.

To use the term "trend," might be interpreted statistically to have some meaning that I don't think we could give to it at this time.

Mr. Jim Burnett outlined the concerns of the National Transportation Safety Board with regard to aircraft maintenance issues:

Air carrier maintenance surveillance is an issue that has been of considerable concern to the Safety Board for a number of years. The tragic crash of an American Airlines DC-10 in Chicago on May 25, 1979, involving maintenance-induced structural damage to the aircraft prior to the accident, served to highlight the importance of reporting, analyzing and disseminating information related to maintenance.

On May 5, 1983 we were reminded of this fact once again when an Eastern Airlines L-1011, en route from Miami to Nassau, lost power in all three engines due to oil starvation caused by the improper installation of chip detectors on each engine without oil seals. Fortunately, in this instance a disaster was averted.

The safety of commercial aviation is dependent on a number of factors, and particularly on proper maintenance surveillance designed to detect and prevent problems that have a potential for disaster. Given the complexities of modern aircraft design and the millions of aircraft operations each year, this task is formidable indeed.

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In an attempt to ensure the highest level of safe operations throughout the service life of an aircraft, the FAA, working with the industry, has developed comprehensive maintenance surveillance programs. An integral part of this complex system is the continued monitoring of problems encountered by the aircraft as it ages, the identification of their origin and the institution of corrective actions taken before they result in an incident or accident. The success of this effort relies partially in the FAA's service difficulty reporting system which involves the collection, analysis and dissemination of reports of service problems.

The way the SDR system is designed to work is that an operator is required to submit a daily report to the FAA maintenance inspector assigned to its operations describing the occurrence or detection of any failures, malfunctions or defects as defined in the regulations.

For example, they include in-flight fires, engine shutdown under some circumstances, aircraft structural damage caused by certain component or system failures. The aircraft manufacturer and authorized repair stations are subject to similar reporting requirements. The FAA collects these reports, analyzes them for trends and disseminates the SDRs thoughout the industry.

The Safety Board recognizes the magnitude and complexity of this task, and supports the FAA's current efforts to improve the efficiency of the system by incorporating it into a highly automated aviation safety analysis system (ASAS). However, the current SDR system and the upcoming ASAS are only a portion of the FAA's surveillance function. Each is designed to augment the primary means of monitoring air carrier maintenance operations, which is accomplished through the personal oversight of the FAA principal maintenance inspector (PMI) located near each carrier's principal maintenance facility. These inspectors review the carrier's continuing maintenance program and records to assure that the carrier complies with the regulations.

The Safety Board is concerned that there have been many instances in which problems have occurred and their significance missed—either because they did not fail into a required reporting category or were reported, perhaps repeatedly, but overlooked in analysis.

The Chicago crash in 1979 is a vivid example of an accident which might have been avoided had an earlier occurrence been reported and accurately analyzed. You may recall that the accident occurred when the aft bulkhead of an engine pylon failed and the entire pylon and engine assembly separated from the airplane as it was taking off. During the separation other structural damage occurred that affected the airplane's controllability. The pylon aft bulkhead failure was found to have resulted from fatigue emanating from a crack which had been caused during an earlier engine pylon assembly removal and reinstallation.

The procedure which the airline used during that maintenance operation differed from that recommended by the manufacturer. We believe that the procedure had not been analyzed adequately to determine whether or not there was a risk of damage to the aircraft structure.

The opportunity to analyze this different procedure presented itself when, five months before the Chicago accident, another airline damaged the same structural element, using the same maintenance procedure.

Although that airline knew the damage had occurred and the aircraft manufacturer had to be engaged to engineer a structural repair, the indicent was not reported to the FAA. Why? The damage did not fall into any of the defined reporting categories. The one category under which it might have been reported was the classification of a major repair. However, the definition of "major" and "minor" repairs leaves too much room for subjective judgment, and the repair was not categorized as major.

The Safety Board believed in 1979 and continues to believe now that had the initial occurrence been reported and properly analyzed, the danger potential of the different maintenance procedure and the resultant structural damage would have been apparent and would have prompted inspections before the Chicago accident of other airplanes on which similar work had been performed.

After the accident the Safety Board issued eight safety recommendations to the FAA, two of which were intended to rectify what we perceived to be a shortcoming in its reporting requirements and maintenance surveillance. Specifically, we asked for more definitive requirements to assure that any damage to significant structure of an aircraft is reported so that the circumstances and consequences of the damage can be analyzed to ascertain whether it has broader application to other operators. We also recommended that the FAA become more directly involved in the approval of hazard analysis and new maintenance procedures when the procedures involve structurally significant components.

We remain concerned because the FAA has not taken these recommended actions, although they did address other specific recommendations we made related to the DC–10's design and operational procedures. In response to recent correspondence wherein the Safety Board categorized those recommendations relating to maintenance surveillance and service difficulty reporting requirements as "closed—unacceptable action," Administrator Helms cited the extensive SDR system and the development of the ASAS as adequate to address those issues. However; the fact remains that if it occurred today, an airline still would not have to report significant structural damage inflicted during maintenance. We believe and hope that such reports would be infrequent, but they should be required.

Furthermore, while we support an automated analysis system, we do not believe that it can be totally effective in detecting a potential hazard based upon an isolated occurrence. The system cannot be viewed as a substitute for the personal involvement of the air carrier maintenance inspectors.

(1) SERVICE DIFFICULTY REPORTING SYSTEM

Congressman Glickman questioned Mr. Jim Burnett and Mr. William Laynor on the Service Difficulty Reporting System and the Aviation Safety Analysis System:

Mr. GLICKMAN. You have criticized complete reliance on an automated analysis system as not being effective in detecting a potential hazard based upon an isolated occurrence.

Mr. BURNETT. That is one of the points, if you are just looking at trends, I don't necessarily know that the FAA is planning to do this, but if their system results in looking totally at trends, at statistical information, the very important information that might be revealed from a single occurrence may be neglected.

Mr. GLICKMAN. Do you characterize the fact that the service difficulty system can be improved as a major or minor problem with respect to the current system of reporting problem, with respect to the current system of reporting problems, maintenance problems?

Mr. BURNETT. Certainly, to the extent that it was reflected in our recommendation that we made out of the DC-10 accident, it is a major problem. That was a major accident, the largest accident we have had in U.S. air carrier history. It could have been avoided, we think, if there had been better reporting.

Mr. GLICKMAN. Since that time, what I am trying to figure out, do we still have holes in the reporting system?

Mr. BURNETT. Yes. The recommendations we made for imporvement of the reporting system have not been adopted by the FAA.

Mr. GLICKMAN. Specificially, again for the record, what has the FAA failed to do with respect to the reporting requirements which required you to make your file closed, unacceptable action?

Mr. BURNETT. There are several things. Many of them, the FAA had told us that they were going to do, and then subsequently decided they would not do. Among them we had recommended that they define the terms "major repair" and "minor repair" so that air carriers or manufactures would have guidance as to what needed to be reported under the category of a major repair.

We wanted them to include any kind of damage to significant structural items as part of major repairs. And the FAA actually put out a notice of proposed rulesmaking in this matter, and then, because of adverse comment from aircraft maintenance people and air carriers, withdrew that. That is one example.

Mr. Laynor, would you like to continue?

Mr. LAYNOR. Well, some of the other recommendations which we have closed involve the observation and analysis of hazards that might be associated with the deviation in maintenance procedures, or the establishment of new maintenance procedures. We believe here that there has to be a little bit more personal involvement by the FAA inspectors to be aware that a carrier is undertaking some new maintenance procedures, to find out what observations have been given to those procedures to insure that they don't pose a risk to significant structure of the aircraft.

We feel something like a fault analysis of maintenance procedures such as is required during the [illegible]cation of the airplane itself is in order.

Congressman Glickman and Congressman Carney questioned the NTSB on the regulations dealing with inflight engine failures and shutdowns:

Mr. GLICKMAN. You indicated in your testimony in connection with the Lockheed-1011 situation, I assume you are investigating that particular incident.

Mr. BURNETT. Yes, we are certainly.

Mr. GLICKMAN. But that a precautionary engine shutdown in flight does not necessarily require reporting.

Mr. BURNETT. That is correct.

Mr. GLICKMAN. That concerns me. If it doesn't require reporting how are you or any other carrier going to know what the nature of that problem was on a precautionary basis?

Mr. LAYNOR. Well, Mr. Chairman, the shutting down of an engine in flight may require reporting. If it requires deviation from the aircraft's schedule, it requires reporting under the interruptions report requirement. There are a number of time when aircraft are shut down for precautionary reasons which are not reported. But we certainly hope that those time in which they are reported are sufficient to give you the indication of a trend of a problem.

Mr. GLICKMAN. Whose judgment is it whether to report this or not?

Mr. LAYNOR. Well, it is regulatory under certain conditions. If an uncontained engine failure occurs which results in aircraft structural damage, that is a required reporting. It is merely precautionary shutdowns where the crew for some reason or another believes that they have an engine problem and they can continue to land at their preplanned destination, that does not require reporting.

Mr. GLICKMAN. But the United 727 that left Washington National and came back because of an engine shutdown, that would have required reporting because it did not go to its completed destination?

Mr. LAYNOR. That is correct.

Mr. GLICKMAN. I guess my concern is that as aircraft get older, as we have structural defects occur because of that, I would want to ensure that there is a complete and full reporting of every potential problem to the FAA and to other carriers as well, so they can avoid potential maintenance problems. I gather, maybe you can correct me, that you indicate, Mr. Burns, in your testimony that the service difficulty system can be improved.

Do you see an opening here where unreported errors can occur, unreported problems?

Mr. BURNETT. We certainly did in the investigation of the DC-10 crash in Chicago, where we found that there had been, as we recited in the testimony, a problem, a procedure used in maintenance which had been established in the course of the problems that developed with Continental Airlines to result in structural damage to the engine mounting. And this information, of course, was not reported to the FAA and, therefore, could not be used to correct that problem and change the maintenance procedure, the same maintenance procedure that was being used by American Airlines.

So that is an example of our concern. I think the problems here are twofold. One is there needs to be a broader reporting system so that some of this information can get into the hands of the FAA. And there needs to be improvement in the analysis of the information once it is in the system.

Mr. CARNEY. If it is significant to report an engine shutdown because the plane didn't make its destination, oftentimes it would be procedure prudent for a pilot to go to the destination, a better

equipped airport, better weather conditions, he is maybe more than 50 percent through his flight and he could arrive sooner. So it doesn't make sense to me that we arbitrarily say if you reach your destination don't worry about an engine shutdown.

Mr. BURNETT. A very valid point. I think the other thing we are going to have to consider in our evaluation of that matter is the other point that you raised. I don't know what we are going to do to the system if we ask to have all engine shutdowns reported. So as I say, that is something that I don't want us to be seen here as saying no on, because that is something——

Mr. CARNEY. I can appreciate what you are saying. It goes back to my saying, will we be crying wolf.

Mr. GLICKMAN. I would just say this: If we didn't have the most skillful pilots in the world, that plane could have gone into the drink and nobody would have ever known what caused those engines to fail. We would have speculated, but we would have not known because I am sure that a mechanic wouldn't have said "I forgot to put the 'O' ring on." And the fact of the matter is that it is extremely disturbing to see that even if we have the systems right and even if we have the regulations on the books, that we may have a serious follow-through problem here which could be compounded by the fact that we have lots of struggling carriers right now and carriers that are operating in a deficit financial position, a lot of new deregulated carriers that may not have the experience in doing some of these things that you talked about today.

I don't mean to imply that we have got a crisis now, but I think that it is useful that you, at the NTSB, continue to follow through on this very, very carefully, because it concerns me very, very much.

Mr. BURNETT. I assure you, Mr. Chairman, that we will follow through.

Mr. GLICKMAN. Thank you very much, Mr. Burnett.

Honorable J. Lynn Helms, Administrator, Federal Aviation Administration, outlined the purpose and function of the Service Difficulty Reporting System (SDR) and the Aviation Safety Analysis System (ASAS):

Mr. HELMS. I am aware that the subcommittee is interested in discussing the National Transportation Safety Board's recommendation that the FAA expand its Service Difficulty Reporting system. While we intend to refine and improve upon our reporting system, we have concluded it would be counterproductive to implement significant changes prior to the introduction of our Automated Safety Analysis System, ASAS, which will automate the Service Difficulty Reporting program.

More specifically, the changes which would be required to expand/alter our current manual dominated reporting system would divert critical FAA resources—I refer specifically to talent, not dollars—from the more important task of automating and improving our whole safety reporting system, and would likely delay implementation of this advanced system.

Let me put this into better perspective by first explaining how our current reporting system works, including the types and amounts of safety information already generated within that system, and then by describing our next generation reporting

system, ASAS, which will offer substantial improvements over our current system, and is hopefully not far away.

The FAA's Service Difficulty Reporting system is a comprehensive system for collecting, organizing and disseminating information on specific problems which occur in aircraft systems and components. The purpose is to get the information to persons within FAA and industry who can analyze the data, spot trends, and take appropriate corrective action. It is a system which has been in place for many years, is continually improved, and has worked well, but not without flaws—and certainly not without need for further refinements and improvements.

Under our reporting system, we obtain reports from all segments of the aviation industry on significant kinds of failures, malfunctions and defects in aeronautical products which could adversely affect the safety of flight. The Service Difficulty Reports, SDRs, are coded and filed in a central computer for statistical and analytical purposes. Summary SDRs are published weekly to alert both FAA personnel and industry to potential problem areas. We currently receive about 23,000 SDRs a year from various segments of the industry. This figure includes those required by regulation, and also those submitted voluntarily.

Through the SDR program, we receive Mechanical Reliability Reports from air carriers on problems which might endanger the safe operation of their aircraft; Manfunction or Defect Reports, which must be filed by certificated air repair stations and Part 125 operators concerning serious failures, malfunctions, defects or other recurring airworthiness problems discovered in aeronautical products; and Special Reports are filed by FAA principal air carriers inspectors on significant failures, malfunctions or defects in the widebody fleet. Every carrier has an assigned FAA Principal Inspector.

To supplement the kinds of information received under the SDR program, we also require further reports from manufacturers and air carriers. Air carriers are called upon to file Mechanical Interruption Summary Reports for flight interruptions or an unscheduled change of aircraft en route or an unscheduled stop or diversion from a route that is caused by mechanical difficulties or malfunctions. Manufacturers are required to file reports with the FAA on 13 identified types of problems such as fires, braking system problems, engine failures, and the like, if they have not been reported by another source to the FAA.

Collection of all these data would be meaningless if they were not put to use. As I have indicated, appropriate FAA offices, often those in which the reports are initially filed, use the information to take corrective action, if needed. In addition, FAA circulates the information throughout the agency and the user community.

For example, a weekly summary of Air Carrier SDRs, containing approximately 8,800 reports filed by carriers each year, is circulated to approximately 535 airlines and other interested persons, as well as to all FAA Air Carrier District Offices, ACDOs, Flight Standards District Offices, FSDOs, and General Aviation District Offices, GADOs. The General Aviation weekly summary circulates about 750 selected reports per year to about 4,500 organizations and individuals as well as ACDOs, FSDOs and GADOs.

(2) AVIATION SAFETY ANALYSIS SYSTEM

FAA Administrator Helms explained the need for the Aviation Safety Analysis System:

Mr. HELMS. Obviously, with the passage of time and the proliferation of reports, problems have arisen with the Service Difficulty Reporting system. It is a slow, labor-intensive system. Different regulations governing different reports make data extraction more difficult and costly than necessary. The system cannot respond readily to ad hoc questions.

In an effort to overcome these problems, FAA formed a task force last January to examine the system and determine FAA and user needs, and recommend ways to better meet those needs. To maximize effectiveness, suggestions must dovetail with the field modernization program and the Aviation Safety Analysis System. It is the ASAS system which will give us the capability to automate the SDR program.

The ASAS program will consist of 382 computer/processing units anchored by a central information processing facility in our Aeronautical Center at Oklahoma City. Each district office will be connected through its regional office to the main computer. Headquarters in Washington will have direct access to the computer. Each district office, the regional office and Washington headquarters will have a level of information processing to allow it to enter, store, retrieve, and print pertinent data. The Service Difficulty Reporting system will be one important data base of ASAS. The automation capabilities of ASAS will greatly increase the quality, timeliness, accessibility and distribution of the SDR data. Eventually, non-FAA parties will be able to directly enter data and obtain access to data in aggregate forms.

Additionally, we have under development an improved automatic trend evaluation and alerting system. This will give the aviation community valuable early warning of potential hazards or emerging problems. It will allow FAA to identify unsafe trends more quickly than currently possible, design and evaluate corrective action alternatives, and implement the most appropriate course of action.

We expect to implement a prototype SDR/ASAS by January 1984, with national implementation by the end of 1984. The revised SDR program—based on the work of the special evaluation team I mentioned earlier—will be incorporated into the ASAS by the end of 1985.

Thus, Mr. Chairman, we believe that the ASAS program now underway—which has been endorsed by the President's Task Force on Aircraft Crew Complement, the Blue Ribbon Committee of the National Reserve Council, and the GAO—coupled with our SDR task force work, will result in a vastly improved system that will best serve the interests of aviation safety. Through this comprehensive approach to upgrading the system, concerns such as those raised by NTSB will be addressed and appropriate changes will be made.

I would like to take this opportunity to seek the support of the committee for the full implementation of our ASAS system, including acquisition of the computer system.

The advantages of ASAS are that they will now allow the inspectors to no longer have to use their time on filling out forms and paperwork, it will be there, and allow them more time to do the specific surveillance out of the line to which you have been addressing yourself. So we agree with you. We cannot in any way abdicate that.

The combination of increasing training and surveillance by the air carrier, increased surveillance by us, ASAS will still require all of those. It takes paperwork off our back.

(3) AIRCRAFT ENGINE FAILURES

Mr. Craig Beard, Director, Office of Airworthiness, Federal Aviation Administration, commented on the issue of aircraft engine shutdowns:

Mr. BEARD. In addition to the individual items that must be reported, we also have the Mechanical Interruption Summary reports. These reports are also submitted to the district office. The principal maintenance inspector does review these as they come in. This is the system where we see the engine shutdowns. If the maintenance inspector sees engine shutdowns that he believes reflect a significant safety problem, he will then prepare the Service Difficulty report that does go to the data branch and feeds backup from the engineering office.

Mr. GLICKMAN. Will all engine shutdowns go through this system, or only those that the carrier believes jeopardize safety?

Mr. BEARD. I would say all engine shutdowns are getting into the system. They do not necessarily go beyond the principal FAA maintenance inspector, but they reach the FAA through that system.

Mr. GLICKMAN. But on the current system, there seems to be a hole in the system by which something like this could have happened before, and let's say failure to place "O" rings on there, either by other carriers or Eastern or whomever, and that may have not made it through the system so that it would be disseminated out there to other carriers, watch your maintenance people or make sure your vice president of maintenance is aware of this problem. That needs to be corrected very desperately.

Mr. HELMS. Yes, sir. It is the driving reason for ASAS, when the maintenance system was started some years ago and there were approximately 100 carriers—today there are over 400 trunk carriers, commuter carriers and regional carriers. In addition, there is a proliferation of the different types of equipment. You just can't do it manually any more, so we have to automate it. It is the only way we can do it.

Mr. John Ralph of the Air Transport Association of America commented on the Federal Aviation Administration's maintenance monitering programs:

Mr. RALPH. Mr. Chairman, in my lengthy prepared statement I develop both a situational and historical perspective which was important we believe in understanding the current context of FAA SDRs. Just let me capture, if I may, the two thoughts that we wanted to portray there. The first is that any imposed reporting system is only one of the data gathering mechanisms used by the airlines to control its maintenance program. Within each corpora-

tion a vast amount of information is collected on a daily basis. This information is shared with the FAA air carrier inspector. Also, there is a daily exchange of information between the carriers, primary aircraft manufacturers, vendors and the FAA.

The second major theme that I would like to capture from our discussion on perspectives, is that one of the dilemmas, and I must say we don't have a solution to the dilemma, but nevertheless, one of the dilemmas of reporting systems is that quite often there is an impetus or a thrust to collect more and more data, and the system runs the risk of becoming cluttered with information that may be interesting, but indeed ancillary and noncritical information from the safety point of view.

The problem that grows out of this phenomena is that an overabundance of data may act to hide or submerge those few important bits of information of a true safety significance thereby frustrating the very safety objectives the program was designed to accomplish.

While we concur with the objectives of the safety analysis system, we believe simply inputting into that system the service difficulty reports as presently constituted needs—that issue needs to be looked at.

We believe a decision needs to be made, whether the objective of the program is as an alerting device, which we certainly believe is terribly important, or as a statistical gathering device or both. Then how one should fashion the input data to serve those two purposes. To this end, we have established in the Air Transport Association a task force for our member airlines to develop recommendations for the FAA's consideration.

We are aware the FAA has a large stake in the aviation safety analysis system, and they want it to be successful. The airlines share in this hope for success. And they are very desirous that the alerting function of ASAS not contain a proliferation of extraneous data to the point where it becomes unmanageable or unusable for this important safety function.

In closing, again, let me state the Federal Aviation Adminstration the NTSB and the airlines all share in the ultimate objective of providing the very safest air transportation known to man. We recognize these different institutions may have differing views on how best to accomplish that ultimate safety objective.

(4) AIRLINE FINANCIAL PROBLEMS AND AIRCRAFT MAINTENANCE

Congressman Glickman asked FAA Administrator Helms about the impact of continued financial losses by the airline industry on aviation safety:

Mr. GLICKMAN. Do we have some carriers in this country who, because of financial problems, are not doing the job they should in the areas of airline maintenance and safety?

Mr. HELMS. I don't think we have any that are not following the book and doing absolutely everything that is required. However, we have significantly expanded our inspection over the last 18 months. We do point that inspection more at some carriers than others in recognition of perhaps their economic basis, yes, Mr. Chairman.

Mr. GLICKMAN. So, in fact, you are intensifying your efforts and looking at certain carriers that are having financial problems to ensure that they are doing an appropriate inspection job?

Mr. HELMS. We have the same worries that everyone else has, and because of certain data that are made available to us working in conjunction with CAB, which is not available financially to the open public, we use that as one more input that tells us maybe we better be a little bit more persevering. So our scrutiny goes up, yes, sir.

Mr. GLICKMAN. I guess the heart of Mr. Carney's question is that do all of the technological improvements on your ASAS system or other systems obscure the fact that in this day and age with deregulation, with a whole range of new carriers, with some airlines on the brink of bankruptcy——

Mr. GLICKMAN. The press reported recently that you were sending a team of inspectors to monitor the operation and maintenance of one particular carrier in this country because of your concern that that air carrier was not doing the necessary work on inspection maintenance. Was that a correct statement?

Mr. HELMS. Yes, sir, I have formed a particular team to take a look at a particular carrier.

Mr. GLICKMAN. Are there any other carriers that you have formed that team for, a similar team for?

Mr. HELMS. One other time I had formed a team to take a look at a specific sequence of events which happened on two or three carriers. As a result of that, I signed out implementing instructions which cost the air carrier industry over $100 million. We do that without a cost-benefit analysis. When safety comes up, I don't hesitate to take the action on it. In those cases, yes, we do it.

We don't call a lot of attention to it for the simple reason that sometimes what we find is that everything is all right. What I really want is safety. And I think you get that more by leading people, motivating them into it. But we have been prepared to inspect and make darn sure they are doing it, and we are doing so.

Mr. GLICKMAN. Should the FAA be devoting more of its resources on training, inspection and perhaps pushing back some of its resources on hardware and software?

Mr. HELMS. I learned some years ago, Mr. Chairman, that management can plan to expect what it plans to inspect. It is just that simple. So that supervision must improve within the carriers, and supervision within FAA is becoming more active. We are doing more inspection now than we did two years ago.

Let me go back and relate it since the strike. We have had over 19,000 flights by FAA inspectors in air carrier aircraft solely to make sure that the system is working.

Mr. GLICKMAN. Unannounced? Do you let them know you are on the airplane?

Mr. HELMS. We don't let them know until we walk aboard, sir.

Congressman Glickman asked Mr. John Ralph about the financial situation of the airline industry and aviation safety:

Mr. GLICKMAN. Let me ask you, you represent all the carriers. We have talked a little bit today about the financial ability of carriers and whether that is having an effect on aviation safety. Let me ask you that question directly. Is the current financial prob-

lems of some of the carriers and the effect of a whole bunch of new carriers coming into existence through the deregulated environment having an effect on aviation safety.

Mr. RALPH. I can't speak for all of the new carriers. Some are our members. As a result we communicate with them and know their status. I don't believe that the economic status of our members affects their maintenance quality. I believe that you cannot market an unsafe airline. In today's environment, one of the most important capabilities that the airline industry has found that it must have in order to respond to the market demands is a very very reliable schedule in order to engage in what are called the hub and spoke operations.

This requires very, very close timing between arriving and departing aircraft at their hub operations. Now, you can't perform that kind of an operation with aircraft that are mechanically unreliable or unsafe. Contrary to what I think is the popular mythology, that deregulation has led to a lesser level of safety, I think deregulation and the establishment of the pattern of needs of the traveling public require SAFER operation.

Congressman Glickman asked Mr. John O'Brien, Director of the Air Line Pilots Association about the financial situation of airlines and its impact on aviation safety:

Mr. GLICKMAN. Is the financial situation of airlines having an impact on safety?

Mr. O'Brien. I can't give you specific examples. We can give you a subjective opinion. I talked about margin of safety before. The FAA is required under the 1958 Aviation Act to provide a minimum standard for safety.

The airlines under that same act are encouraged to have the highest level of safety possible.

Now, to provide that highest level of safety is going to cost a certain amount of money and obviously if you are in poor economic shape, and there are some carriers today who are in poor economic shape, you may not be able to, even if you are willing and want to provide that extra margin of safety. You are going to fall back to the minimum level required by law.

We think that under those circumstances, operating in that manner is not as safe as operating when you have a good financial basis and are able to provide that extra margin of safety.

I guess the short answer to your question is that we feel that deregulation today has sponsored a situation that has promoted a situation where the highest level of safety is not available to us and all the operators.

III. AIRPORT SAFETY TECHNOLOGY

Congressman Dan Glickman, Chairman of the Subcommittee on Transportation, Aviation and Materials spoke to the purpose of the hearing and the subcommittee's interest in aviation safety research and technology:

Mr. GLICKMAN. Today the subcommittee will examine the problems of airport safety with an emphasis on the use of new technology to enhance the safety of our airport systems.

It is clear that airports represent the most critical juncture in air transportation. Over half of all civil aviation accidents occur at or near airports. Therefore, it is appropriate that the subcommittee examine airport safety technology generally, as well as specific criticisms of specific airports, in order to determine the adequacy of curent government policy and research effects.

In previous hearings, this subcommittee has considered subjects such as the hazards associated with low-level wind shear which led to the tragic Pan Am accident near New Orleans last year; and aircraft operations in bad weather, such as the conditions which contributed to the accidents at National Airport here in Washington and Boston Logan last year. This subcommittee has supported expedited research activities on wind shear, aircraft deicing, and runway performance as well as on other activities. We inted to continue these efforts.

The topic of airport safety technology encompasses a wide range of complex subjects, and we will attempt to address the most important ones in order to determine that research should be given high priority.

In addition, the subcommittee is interested in looking at some specific airport problems. For example, I am particularly concerned about the Northern approach procedures to Runway 18 at Washington National Airport. As a sesult of an incident on December 28, 1982 where a Piedmont 737 came dangerously close to the USA Today Building in Rosslyn, Virginia, the National Transportation Safety Board recommended that the Federal Aviation Administration make a number of changes in the non-precision approach to Runway 18, and questioned the adequacy of the minimum safe altitude warning (MSAW) system at National Airport.

This is a potentially serious matter, and the subcommittee has a responsibility to hear why the Federal Aviation Administration rejected the National transportation Safety Board's recommendations and if this is a major concern to airline pilots.

We would also like to go into some detail, as time permits, on a number of other important matters such as the approach and departure procedures at other airports, the impact of noise abatement procedures on safety, current aviation weather programs, terminal area guidance, airport design criteria and fire and rescue capabilities.

Mr. Jim Burnett, Chairman of the National Transportation Safety Board discussed the NTSB's current analysis of airport operations and certification criteria (Part 139 of the Federal Aviation Regulations):

Mr. BURNETT. As you know, the Safety Board currently has underway a study to review the adequacy of airport certification criteria and operations.

In view of the fact that this study is ongoing, I am limited to a general discussion of the issues involved pending the Board's review and approval of the overall study. Thus, it would be inappropriate for me to discuss any conclusions or recommendations that may come from our study, with the exception of those that have already been issued.

Technology considerations are only one facet of the Safety Board's study. Therefore, I would like to place airport safety tech-

nology in perspective by describing our study efforts to date and highlighting some areas which might benefit from applications of existing technology or technological advancements.

For several decades specific concerns regarding the safety of airport operations have been identified through airport user experience and accident investigation. These concerns were clearly articulated in Congressional testimony in 1969 leading to the enactment of the Airway Development Act of 1970, which extended the FAA's certification and surveillance authority to air carrier airports.

Responding to this legislation mandate, the FAA developed and promulgated Part 139 of the Federal Aviation Regulation which established standards for airports serving certificated air carriers.

These standards, adopted in 1972, addressed a wide range of airport physical features, facilities, services and operating procedures, all of which were considered crucial to safe aircraft operation. In fact, many of the areas covered by Part 139 regulations have been concerns of the Safety Board for some time, as evidenced by our 1970 recommendation for traction testing requirements, our 1972 recommendations for compatibility of land use around airports and installation of runway distance markers.

The 1982 Air Florida crash near National Airport and the World Airways accident at Boston Logan Airport tragically reemphasized several airport safety issues, including potential safety problems associated with physically limited airports designed and constructed to standards existing before the advent of commercial turbojets.

The Safety Board adopted a study method involving a survey of a carefully selected group of airports which would permit comparisons of those certificated by different FAA regional jurisdictions, as well as comparisons of older and newer airport facilities located in the same geographical area. After evaluating several airports on the basis of factors such as passenger enplanements, runway length, safety area characteristics, types of aircraft served, construction and modification dates, accident and incident histories and approach area characteristics, a study group consisting of 14 airports located in seven different FAA regions was selected for detailed evaluation.

Although data reduction and analysis, as well as preparation of the report are still in progress, the study team has collected the following preliminary findings which I would like to share with you:

Substantial variations were found among FAA regional determinations regarding what constitutes compliance with Part 139 and how compliance should be obtained.

FAA airport certification inspector workload varied considerably from region to region.

Off-airport land use by local jurisdiction, such as waste disposal site locations, can result in obstructions or other potential hazards, which are beyond the control of the FAA and airport management.

Several differences were documented in crash-fire-rescue training and staffing as well as in emergency and disaster plans which were approved by FAA regions under Part 139 requirements.

Overall airport management philosophy and level of commitment to airport facility maintenance varied greatly at the airports under study.

Dimensional and physical characteristics of airport safety areas and their influence on runway maintenance philosophy differed among the airports under study.

A lack of standardization in the construction of fuel storage facilities was observed.

(1) FAR PART 139

Congressman Glickman questioned Mr. Jim Burnett, Mr. William Laynor and Mr. Bernard Loeb of the NTSB on their current study of airports under FAR Part 139.

Mr. GLICKMAN. In your testimony, you said your preliminary review of airport safety that you are doing, substantial variations were found among FAA regional determinations on Part 139 and how compliance should be obtained. So what you are saying is in one region of the country with respect to one airport, there are different standards being applied to airport safety than in another region of the country.

Mr. BURNETT. That is true. Those are our preliminary findings. That may not all be bad but we are going to have to analyze that aspect further in the course of preparing our report.

Mr. GLICKMAN. Well, can you give me an example of the kinds of things that would be different between different regions, different parts of the country, different airports?

Mr. LOEB. Yes, specifically there will be times when enforcement philosophy will differ. In some cases, an approach will be used to work with the airport managers and moral assuagement will be the method used to try to obtain compliance.

In other words, the methods of enforcement might be to come down somewhat harder. In some cases, certain specific recommendations to the airports are made regarding specific parts of 139 that might not be treated by other regions.

So there are differences. I wouldn't say that the standards differ. I would say that just the emphasis differs.

Mr. GLICKMAN. Give me an example of something specific.

Mr. LOEB. Perhaps runway maintenance. When a given runway should be regrooved, when tar should be removed from the runways. There are just differences in philosophies and that probably pertains to CFR and to any number of other areas.

Right now we are still in the process of analyzing the data we have collected. I think to go beyond this at this point would be foolish.

Mr. GLICKMAN. And you are saying that the enforcement philosophy will differ so in some cases the same penalty and airport may get some sort of a violation and in other cases there will be no violation by the FAA?

Mr. LOEB. That could be the case. Yes.

Another area is in the fueling area that you see changes. Snow removal is another area where you see different philosophies, what constitutes compliance with the part and what does not.

Mr. GLICKMAN. Just to take an example. The part will say something like the runway shall be clear of ice and snow and will leave it up to the airport to decide how to do it?

Mr. LOEB. That is correct. That should be in their manuals, and they have a snow committee and so forth that determines when and how. However, in some cases, a compliance might be when you have two inches of snow and in another case it might be half an inch of snow. It might be neither of those. It may be when conditions are reported as poor or nil. So there are just differing philosophies.

Mr. GLICKMAN. Do you think that FAA Part 139 should be revised substantially and made more specific?

Mr. BURNETT. We are not ready to make that kind of conclusion yet, Mr. Chairman.

Mr. GLICKMAN. But clearly there is great variation between airports on how they implement Part 139?

Mr. BURNETT. There is some variation and I think we are going to have to look at that very carefully. We need to be careful that we do not—by an overweening emphasis on consistency you can encourage strictly aggressive enforcement. Regional officials might be discouraged from trying to be out on the forefront or trying to deal with problems that they perceive to be particularly acute in their region, so we don't want to sound as if all of this is bad at the present time.

However, we want to look at it more carefully in the course of our analysis to see to what extent it contributes to good enforcement practices and to what extent it may be reflective of sloppy enforcement practices.

Mr. GLICKMAN. You say the FAA in certification inspector workload varied considerably from region to region. That means you have more man hours in one region or another with respect to airport certification?

Mr. LOEB. What that means is that is some regions you will have 20 airports per inspector and in other regions you may have 40 and 60 airports per inspector with an enormous variation in workload. What this means we don't know right now, but we are looking into that because that was probably one of the most significant features, the enormous difference in the number of airports per inspector to handle.

Obviously they can visit only so many airports. Geography plays a part obviously. If they have to go further, it takes longer and so forth, but there is an enormous variation regionwise.

Mr. John O'Brien, Director of the Air Line Pilot's Association expressed the views of ALPA on FAR Part 139 and airport safety:

Mr. O'BRIEN. The FAA has announced that it plans to issue an NPRM (Notice of Proposed Rulemaking) dealing with revisions to FAR Part 139. While this might sound like good news, it is our information that the FAA plans to further reduce the requirements in Part 139, specifically with the required crash/fire/rescue (CFR) services, in order to relieve the airport operator of the economic burden of providing this public service. This will be a direct degradation of safety in response to economic and political pressures.

This Association is totally opposed to any reduction in the CFR services at air carrier airports. The FAA required minimum level of CFR service falls far below what the International Civil Aviation Organization (ICAO), National Fire Protection Association (NFPA), and most other countries require.

In our opinion, we feel that this NPRM should address those items in Part 139 which truly affect air carrier airport safety. Included in the revised Part 139 should be requirements for standardized VASI's on all air carrier runways, upgraded and realistic safety areas, friction reporting methods, maintenance methods and criteria, upgraded CFR, better information presentation for taxing airplanes, and minimum runway marking standards. These are just a few example areas which need to be upgraded, there are many others that were too detailed to address in this statement.

The FAA's lack of regulatory firmness influences many other areas of airport safety which may or may not be under the airports control. An example of the lack of regulatory control reducing the margin of safety or air carrier operations at airports is the proliferation of Visual Approach Slope Indicators (VASI). Air carrier pilots strive for stabilized approaches to landing. If the airplane is stabilized and ready for landing while you are four miles from the airport you can concentrate on landing the airplane. If the pilots are still getting the airplanes ready to land two miles from the runway there is less time to concentrate on the landing thereby decreasing the margin of safety. The VASI is an aid which is mounted off to the side of the approach end of the runway which gives the pilot information by colored lights on their glide path above the ground in relation to distance from the runway thereby allowing them to stabilize early on the approach. ALPA recommends the installation of VASI on the approach end of every air carrier runway—the FAA does not require them. Additionally, the FAA does not specify which type is to be used when they are installed.

This results in many different types of systems which are all different in operation and glideslope information presentation. No pilot can possibly learn how each type works. The confusion reduces the margin of safety. Standardization of information presentation is one of the cornerstones of aviation safety. The Air Line Pilots Association, International Civil Aviation Organization (ICAO), and International Federation of Air Line Pilots Associations (IFALPA) recommend only three types of visual approach slope indicators; the standard U.S. 2-bar/3-bar, the Precision Approach Path Indicator (PAPI), and T-VASI. This recommendation is based on operational experience.

We feel the best interests of aviation safety will be served if the FAA would standardize the requirements for VASI.

Throughout this statement, FAR Part 139, Certification and Operations: Land Airports Serving CAB-certificated Air Carriers has been referenced as a regulation which is lacking in firmness. This regulation was designed and introduced in order to standardize air carrier airport safety. Unforunately, the regulation is so loosely worded that the airport is not given any guidance on how to achieve the goals laid down in the regulation.

Congressman Glickman asked Mr. O'Brien and Mr. Haase of the Air Line Pilot's Association about the variations in airport maintenance under FAR Part 139:

Mr. GLICKMAN. Give the committee some of the differences that you face at different airports in terms of how they are operated, in terms of landing and takeoff conditions or ground conditions, that the airports have some discretion on.

I would like to know, for example, does Dallas-Fort Worth do something differently than Chicago-O'Hare but unrelated to, let's say, FAA operating procedures that might affect the safety of the airports?

Mr. HAASE. There are definite differences in wintertime conditions as to whether a runway is open or closed between airports in the northern part of the countryside. Some of it seems to be demand related. Some airports are able to stay open longer because there is a lot of traffic, even though in many conditions, the operating surfaces are marginal.

At an airport where the traffic demand is lower, the opportunity presents itself to close that runway and get it cleaned off to the friction level desired.

We see differences in signs at airports in terms of pavement markings and the maintenance of those markings. In some cases, they are maintained very well. In other cases, not at all.

If you look at rubber removal from runways, some airports have excellent programs for rubber removal and others don't seem to have a planned approach. Their action is to remove the rubber only when appropriate pressure is brought to bear.

These are some of the differences that we see.

Mr. O'BRIEN. All those differences we hope to have somewhat standardized by straightening up 139.

In the meeting that FAA has next week, it is a step in this direction and we hope that working closely with the FAA and airport operators here that we can probably standardize some of the conditions we find that Dave has just mentioned.

Mr. GLICKMAN. Well, again, if I am flying into an airport that is faced with snow and ice, I sure as heck want to know that there is some standardization so that at least I have some confidence that the same high standards at one airport will be duplicated by another airport.

Otherwise, I am at the jeopardy of that particular airport that, for whatever reason, whether it is traffic, financial or other reasons, may not have the incentive to do the cleanup like the first airport does. That is not only unfair, but it is unsafe to the flying public.

Mr. Neal Blake, Deputy Associate Administrator, Engineering and Logistics, of the Federal Aviation Administration explained their responsibilities regarding airport certification and operations:

Mr. BLAKE. FAA carries out its duty to insure airport safety through two main regulatory functions: airport certification, and the establishment of flight operations criteria. Currently, the law empowers the Administrator to issue airport operating certificates and set minimum safety standards for the operation of airports serving air carrier aircraft designed for more than 30 seats.

FAA's Airport Standards Office sets the criteria for certification of airports under Federal Aviation Regulation, Part 139.

At the present time, FAA is engaged in a comprehensive review of the standards set out in Part 139. In fact, we held a public meeting on July 14, in an effort to get the views of system users on possible ways to revise and improve our standards.

The information and ideas received at that meeting are undergoing thorough review and will be taken into consideration as the

agency proceeds with its efforts in this area, which may result in a notice of proposed changes to Part 139.

Turning to flight operations, FAA's standards in this area are designed to insure the safety of flight. Those dealing with take-off and landing are especially important, since these are critical phases of flight.

Naturally, airports throughout the country vary in terms of layout, surrounding terrain and buildings, and the like. These factors can limit the feasible approaches to any given airport, and thus are extremely important considerations in establishing operational procedures/instrument approach minimums for an airport.

Establishment of an instrument approach at an airport is based on criteria that consider the visual aids available, terrain and local construction, the type of aircraft that will use the approach, other navigational aids serving the airport, and the effect of air traffic operations at other airports in the vicinity.

Mr. GLICKMAN. I wonder, first of all, if you would tell us a little bit about what was the FAA's reason to conduct a review of Part 139, the whole issue of airport certification.

When did this come about and what do you intend to do with it? Give us some background on this.

Will there be standardization of different operations at different airports as part of this?

Mr. BLAKE. Yes; I think there is, and I think that Chip Mudd may have something to add.

Mr. MUDD. The rule as written applies uniformly to all airports. The problem is in administering it across two coasts to get uniform application and in doing that we try to have regular meetings with our inspectors to compare what one region is doing with another in order to have uniform application, but the intent in the way the rule is written is that it should be uniformly applied and that is our goal.

Mr. GLICKMAN. Well, all of you heard Mr. Jim Burnett talk about preliminary review of their outlook and review of the situation. They say there is a lack of uniformity among regions of the country among airports and the way FAA, in fact, enforces its own rules with respect to Part 139 and a variety of airport standards.

How would you respond to that general accusation?

Mr. MUDD. Well, I would say that there may be some substance to it, but it is a problem that we are trying to overcome and if it does exist, I think it is a very localized thing and it is something that we can clear up rather rapidly.

Mr. Robert Michael, Director of Aviation, Denver-Stapleton International Airport, representing the Airport Operators Council International:

Mr. MICHAEL. The industry has established an enviable safety record. Data compiled by the National Transportation Safety Board note 48,040 fatalities in all forms of transportation in 1982. Of this total, 42,990 were highway fatalities, 596 were railroad fatalities, while 323 lives were lost in air transportation, including commuters and air taxi operations.

The NTSB reports that in the 17 years from 1964 to 1981, there were only 22 incidents in which airports have been included as a probable cause, not a related factor. We would like to note that

there were a total of 885 air carrier accidents over these years and that the 22 involving airports represent only 2.4 percent of the total. The U.S. aviation industry has produced one of the finest and safest air transportation systems in the world.

Irrespective of this long-term airport safety record, the Congress chose to regulate airport operations, and did so in 1970 through the Airport and Airway Development Act, ADAP, by adding a new provision to the Federal Aviation Act authorizing the FAA Administrator to issue airport operating certificates to airports serving air carriers, and to establish minimum safety standards for the operation of these airports. The FAA implemented this legislation through the issuance of Part 139.

the airport operating certificate is issued when the FAA finds, after investigation, that the applicant's airport is properly equipped to conduct a safe operation in accordance with Part 139, and when it approves the airport operations manual which is submitted with the application.

There are approximately 680 FAA certificated airports and never has there been occasion in the 11 year history of Part 139 for the FAA to "revoke a certificate" because of an airport having failed in its safety obligations.

There have been a few times when FAA has briefly suspended an operating certificate in situations over which the airport operator has no control such as a strike by crash/fire/rescue personnel.

In short, we equate the introduction of Part 139 into the airport system as fine tuning an already well functioning safety. It may have inproved safety, but there is no known basis for quantifying the improvement.

We cannot ignore, though, that the effect of Part 139 is a significant financial burden on small airports. While large and medium hub airports have been able to cope with the increased costs that accompany airport certification, small and non-hub airports—those enplaning 2,000 airline passengers or less daily—have often found it quite difficult.

(2) WASHINGTON NATIONAL AIRPORT

Mr. Jim Burnett, Chairman of the National Transportation Safety Board, expressed their concerns about the northern approach to National Airport:

Mr. BURNETT. One final matter I would like to mention concerns the exception I made at the beginning of my testimony regarding the limits to which I can discuss potential conclusions and recommendations resulting from the Safety Board's airport study.

On December 28, 1982, shortly after our study team was assembled, an incident took place "right in our own back yard" in which a B–737 was reported by numerous ground witnesses to have flown dangerously close to a relatively tall building located in Rosslyn, Virginia. Although the FAA insisted that the plane made a "normal instrument approach," the Board decided to investigate the incident as a part of its review of Washington National Airport operations in connection with the airport study.

The Board determined that the plane was, indeed, low—at a altitude about 400 feet when passing the 396-feet-high USA Today

Building. In addition, the airplane drifted to the right of the inbound course—I think the course would have placed it 500 feet away, and it drifted inside, placing it nearer the building than it normally should have passed.

In a letter to the FAA Administrator, dated March 24, 1983, the Safety Board made four recommendations designed to prevent occurrences of planes flying too low and too close to densely populated areas on approach to Washington National Airport.

The FAA did not concur.

The Safety Board strongly disagrees with the FAA's position and currently is in the process of preparing a response. I assure you that this matter is not closed.

Congressman Glickman questioned the NTSB on the approach procedures to Washington National Airport:

Mr. GLICKMAN. Let me go for a moment to the situation that you mentioned on Piedmont 737. During your investigation of the Piedmont 737 which came close to the USA Today Building, were you able to determine the frequency of similar incidents where aircraft have come too low or too close to the buildings in Rosslyn?

Mr. BURNETT. No, we did not undertake the frequency with which that takes place. That is really something that is out of our manpower capability.

Mr. GLICKMAN. Well, you know, I have always been concerned about the fact that there are skyscrapers near the flight patterns of this airport and obviously I would guess because of the regulatory situation the buildings came after the runways, and there wasn't much the FAA, I guess, could do to prevent the construction of those buildings, was there?

Mr. BURNETT. As far as I know, they don't have any power to do that.

Mr. GLICKMAN. And the height limitation on these buildings, were they in any way related to the operation of that airport?

Mr. LAYNOR. Well, I would like to add to one of your previous questions that in the investigation of the Piedmont incident, our investigators talked to number of people who work in the USA Today Building, and their opinions were very subjective, of course, but they alluded that they are quite frequently a little concerned about the proximity of some of the airplanes on that approach.

Mr. GLICKMAN. It is damn close to the flight pattern, isn't it?

Mr. LAYNOR. The building itself does not intrude upon the legal obstruction path for the approaches that are conducted over Rosslyn. One of our concerns is that in very low-ceiling weather there seems to be a tendency perhaps to come a little bit closer, sneaking down perhaps when you visually acquire the airport on the VOR-DME approach. The approach itself requires aircraft to be at an altitude of 900 feet above sea level at a three nautical mile DME fix.

The building is inside of the lateral span of the approach clearance and the legal height above that building has to be 250 feet of clearance for any aircraft. The building, I might add, is only about 2,000 feet within the three nautical mile DME fix, so this would normally put aircraft at about 800 feet descending from 900 feet to minimum descent altitude of 720 feet. Beyond that, if the aircraft picks up the runway visually, it can descend below the MDA.

However, the proximity of the three DME fix itself to that building is kind of a constraint on the minimum altitude that the airplane could be.

Mr. GLICKMAN. What you are saying is that the pilot wants to get down to see that runway and in doing so he may get down a little more quickly than be should?

Mr. LAYNOR. Well, on the day in question, the ceiling was varying between 600 or 700 feet. It was probably higher at times. Most likely, the pilot picked up the runway at a higher altitude, but in order to keep sight of it, he descended down below 700 feet in order to maintain sight of the runway environment.

Mr. GLICKMAN. Now, if, in fact, the minimum safe altitude environment at National Airport is unreliable, is there any way to determine how often airplanes come in too low on their flight to National other than taking the flight air recorder on every airplane apart?

Mr. LAYNOR. Well, during the investigation of that incident, our field investigators spoke to the controllers at National, and it was their observation that quite often the altitude and coding portion of the aircraft transponder return is somewhat spotty. It is occasionally not recorded or not transmitted or not received, at least by the airport radar and aircraft making that approach. It could be because the reflections of the signals off the nearby buildings or for other reasons the signal gets scrambled and it is just not received and decoded.

The investigators cited this as a concern because the altitude and code reply is what is necessary to key the minimum safe altitude warning, and they say that this is not reliable.

They also observe that occasionally when the equipment is picked up after maintenance that it becomes a little bit more reliable, but it does not maintain that.

Mr. GLICKMAN. Let me ask you a couple of questions about National Airport. If you had been the manager of the airport, would you have fought the construction of buildings like the USA Today Building that is on the north-south approach?

Mr. BURNETT. I don't think that I am in a position to answer that at this time. Hopefully when we are further into our study, I might be, but I certainly couldn't say now that I think that the manager of Washington National Airport was remiss in not doing so, partly because our own recommendations that we have made reflect that we believe that adjustments in the published approach procedures could remedy the problem that exists there.

However, I think one building is one thing and 50 buildings is another.

Mr. GLICKMAN. So you are not inviting construction of similar facilities in Rosslyn?

Mr. BURNETT. Not inviting it?

Mr. GLICKMAN. Well, you are not encouraging that, you as the NTSB would not encourage the construction of similar tall buildings on the landing approach?

Mr. BURNETT. I will put it this way. From what I know, I would be hesitant to rent an office on the top floor of some buildings in the Washington area.

Mr. John O'Brien, Director, Air Line Pilots Association, explained the airport rating system of the International Federation of Airline Pilots Associations:

Mr. O'BRIEN. First, I would like to state emphatically that Air Line Pilots Association does not consider any of the 400 airports we operate in to be unsafe. On the other hand, there is also no question in my mind that some airports provide a higher margin of safety than others.

A good example of the different levels of airport safety can be found right here in the Washington area. Comparison of the physical layout, the navigation and approach aids and the operational procedures and noise abatement procedures between Washington National Airport, Dulles and Baltimore-Washington International Airports will very quickly lead to a conclusion that Dulles and BWI are safer airports to operate out of than is National. Our detailed submission to the committee's staff provides much more information on the problems of National Airport.

ALPA does not rate airports. However, the International Federation of Airline Pilots Associations of which ALPA is a member does classify international airports that have noteworthy deficiencies. This airport designation system is limited to international airports.

If problems are found to exist at international airports, they are assigned a star designation. The worst classification an airport could have is a black star designation. This indicates that a critically deficient situation exists at a particular airport. The only airport in the U.S. which has a black star designation is Los Angeles. The L.A. black star is due to the implementation of noise abatement operational procedures which do not provide an adequate margin of safety. A detailed description of the airport starring designation system is provided in our submission for the record.

Congressman Glickman asked Mr. John O'Brien, Director of the Air Line Pilots Association, about Washington National Airport:

Mr. GLICKMAN. Let me ask you this. Would Washington National get a star if it were an international airport?

Mr. O'BRIEN. I would think so. The way the system works is that the pilot group responsible for reviewing airports in this country make recommendations to ALPA. I think we had presented the recommendations that we made to FAA to ALPA.

They would have looked at those and probably assigned a star rating to National.

Mr. GLICKMAN. Again, what specifically are those recommendations that you make on Washington National?

Mr. O'BRIEN. We have made a wide range of recommendations on National.

After the Air Florida accident, there was a special NTSB group that looked at National just from the airport side. We participated in that group and submitted a special report to the NTSB, and through the NTSB and FAA, a copy of that has been provided to the committee staff.

I will give you a few examples of the kind of things that are utmost in our minds at National.

The approach down the river that you heard about earlier this morning, back in 1978 we recommended to FAA that some specific changes be made to that approach procedure.

As a result of those recommendations, FAA looked at the overall approach procedure situation from the north down the river, and did an internal staff study and looked at relocating the localizer over at Bolling Air Force Base. They actually put a mobile localizer over there, I understand, and did some testing, and working with Eastern Air Lines and Miami, flew some simulator approaches on this new procedure.

In our opinion, it is a much safer procedure. It only requires one turn on the final and gives you precision approach guidance down to around the 14th Street Bridge and also provided lower minimums at National. It was more flexibility for the operators getting in and out of there.

Now, that recommendation and study that FAA performed, I understand has been shelved because it was really intended to try to get wide-bodied airplanes to National Airport.

Now, we think in addition to wide-bodied airplanes, I think overall operations would have been improved if they had gone ahead and implemented that proposal.

Dave Haase here on my left is an active line pilot and flies into National very occasionally. He may wish to add something on National.

Mr. HAASE. I would think that with respect to the approach that we presently fly into runway 18 at National Airport, it is the most difficult approach we fly anywhere on most of our airline systems to a primary air carrier runway, particularly under conditions of low ceilings and poor visibility.

It has not only high minimums but it lacks the instrument electronic vertical guidance for the later stages of the approach. It is basically an approach to visual conditions, and from there on you try to fly the river on various landmarks in order to find the runway at the airport.

It is something that really, from the air carrier pilot standpoint, is a deficient approach. It is marginal.

Mr. GLICKMAN. Will an MLS resolve the southbound approach system, a microwave landing system?

Mr. HAASE. I think there is some very real potential for using an MLS on runway 18.

Mr. GLICKMAN. Have you ever experienced, Captain, any hydroplaning at National Airport's runway 18 in bad weather?

Mr. HAASE. There were a couple of times when it seemed as though the breaking action was not what you would normally expect on a wet pavement with a grooved runway.

Mr. GLICKMAN. And without that additional overrun it becomes a serious safety problem?

Mr. HAASE. Absolutely.

If there is a safety area there of an appropriate length, then there is room for an airplane to get stopped should it go beyond the length of the runway. The same thing if we are landing or taking off to the north.

In that section just to the left of the runway, if it could be filled in to provide a safety area, we could eliminate a major hazard.

Mr. GLICKMAN. What is the length of the current overrun at the airport, do you know?

Mr. O'BRIEN. I don't think we can tell you specifically. I think there is around 200 feet of surface going towards the north.

Mr. GLICKMAN. It is practically negligible, isn't it, compared to other airports?

Mr. HAASE. That is correct.

Mr. GLICKMAN. What length does the FAA currently recommend for an overrun?

Mr. O'BRIEN. There is a safety area and there is an overrun. There is 200 feet of safety and 1,000 feet of overrun. We would much prefer to see a 1,000-foot overrun at the end of all runways served by air carriers.

Mr. CARNEY. You have a 6,900-foot runway and you need 1,000 feet of safety. So you add 1,000 feet on the southern end of it.

Now you have a 7,900-foot runway, no?

Mr. O'BRIEN. Not quite. I wish we did, but we don't. All you do is have a prepared surface.

For example, at the north end of runway 36 or 18, if you had 1,000 feet of overrun there, that Roach's Run would not be there. You would have a prepared surface. It might not be paved. It may be just a grass surface or could be prepared.

Mr. Neal Blake, Deputy Associate Administrator for Engineering and Logistics, and Mr. Chip Hunt, Director of the Office of Flight Operations, Federal Aviation Administration, responded to questions about the northern approach to National Airport:

Mr. GLICKMAN. With respect to the NTSB's recommendations at National Airport, the NTSB was quite strong in indicating its concern about your rejection of their recommendations with respect to the approach to runway 18 in National Airport.

Why were the recommendations of the NTSB rejected?

Mr. BLAKE. Well, FAA reviewed and responded to the recommendations relevant to procedures primarily for runway 18. I think our review has shown that the approach procedures meet all of the criteria established in TERPS, which is the document controlling establishment of instrument procedures.

It is our conclusion, I think, from this review that the approaches, when they are properly flown, present no unusual risk at any point during the path, and I think provide more than adequate margins of safety.

I can't stress enough, though, that the terminal procedures were not designed to accommodate a flagrant disregard of published minimum altitudes or rules, but are, in fact, predicated on safe procedures.

Mr. GLICKMAN. Yes, but, Mr. Blake, neither were your rules designed with the possiblity that we would build skyscrapers along the flight path. Don't you think that that should have some implication as to the whole issue of landing patterns and approaches at major airports like Washington National?

Mr. BLAKE. Well, we have established standards for the height of buildings, and the approach path to an airport, and those standards have been complied with in the establishment of approaches to runway 18 in all cases.

They are rather short skyscrapers, but they do fall below the plane.

Mr. GLICKMAN. One is almost 400 feet high. That is a pretty good sized building. How long ago were your standards set up in terms of the size of buildings and structures?

Mr. HUNT. I can't answer when these standards were set up. However, the clearance with a minimum altitude over the building that we are talking about is considerably more than the standards.

If you come in on that approach, when you come by that building, you should be approximately 900 feet descending to 720 feet on down the river closer to the runway.

So, if you fly the approach the way it is designed to be flown, you are going to be 500 feet above that building.

Mr. GLICKMAN. I guess the issue was in marginal weather conditions when you are looking for the end of the runway with cross winds, sometimes you may be off a little bit.

Mr. HUNT. The lateral displacement of that building is well outside of our requirements. In addition to that, if you maintain your altitude, even if you went right off the top of the building, you would clear it by 500 feet, which is considerably more than you clear a lot of other buildings on a lot of other approaches when you are coming into an airport.

I would agree that it would be great if every approach we had was clear. Being a pilot, I don't like to know that I have got buildings down under me either.

But when you look at the approach to 18 at National, the criteria that is set up, and if you follow the published approach procedure, as a result—in fact, prior to the time this Piedmont flight was reported below the building or close to that building, I had asked for people in flight inspection to go out and actually fly each one of the approaches to National Airport from the North.

Mr. GLICKMAN. In bad weather?

Mr. HUNT. Well, I don't know what the weather was at the time they flew it, but we flew the approaches to check it out using the flight inspection equipment to ensure that the radios were in tolerance and there was nothing wrong with the procedures.

Mr. GLICKMAN. I guess my problem is that all these things work fine if everybody is working fine, but sometimes people deviate. Whether it is the pilots or the winds or the ceilings or all sorts of things, and I think we have taken a very marginal airport and we have degraded that airport by putting buildings up there and it concerns me very much.

But, again, going back, the NTSB has specifically recommended, and they made it a high priority that the north/south approach to that runway 18 be modified. They talk about the minimum safe altitudes warning systems function did not work very well and the antenna array for the airport, and where they are located.

Do you categorically state that those recommendations will not improve the safety on another north/south landing at the airport and are not needed?

Mr. HUNT. I can't speak to the equipment, but I would say if you fly the approach the way it is designed and published, it is a safe approach. We don't have any problem with it.

Mr. GLICKMAN. That may involve, I guess, my question, the standard of care and of external conditions which may be perfection. I guess my concern is that the worry that because of the realities of the situation there in terms of ceilings and everything else that you might deviate a little bit from it and I would urge you to take a review of this issue, again, because I know that the NTSB is going to respond to your letter just last month, I guess it was, in which you responded to them and this is a high concern for people in this part of the country.

Mr. HUNT. Sir, in line with that we do have a program right now where we are monitoring flights into National Airport on runway 18 so that we will be able to determine if we do have a big problem of people leaving the minimum altitude prior to the time that they are supposed to.

So we have a program to monitor the flights in that is ongoing at this time.

(3) FAR PART 77

Mr. John O'Brien, Director of the Air Line Pilots Association, discussed Federal Aviation Regulations (FAR Part 77) and their impact on takeoff and approach procedures:

Mr. O'BRIEN. The problem there is that under today's federal regulations, the review that FAA must conduct to determine whether those proposed structures will be a hazard or not don't cover or the criteria does not cover turning departures off of runways. It is just straight out. So, therefore, you don't have to do the same kind—or let me turn that around.

The FAA is unable to make the same kind of evaluation on those proposed structures other than they would have been able to make if they were located in a straight-out departure area.

Mr. GLICKMAN. so that is the limit of FAA's regulatory power to prevent construction of structures directly in line with the end of the runway.

Mr. O'BRIEN. Part 77 of the FAR covers that particular aspect of construction; it does not cover turning departures.

There are other provisions. There are procedures for instrument departure procedures, covered terminal instrument procedures. When you look at the TERPS, those are pure operational procedures. They are not to identify structures. They provide criteria for the airplane operator to have a safe clearance of a structure that may already be there.

You can use this criteria to look at structures and then say, okay, we know the structure is there. We will require the pilot to either see and avoid this structure or put some visibility minimums on operations on that runway which will allow him to see the structure.

It does not do anything to the builder. It does not allow or give him notice that his proposed structure works; indeed, can potentially be a hazard. It puts all the responsibility again back on the airline or pilot, both, to offload payload to clear those structures, or the pilot to see and avoid those structures.

Mr. GLICKMAN. The real unfortunate problem we get is a situation like at Washington National where the airport was built so

long ago that I gather that we never even made much of an effort to realize this problem until 10, 12, 15 years ago. By then it was probably too late.

Mr. O'BRIEN. The problem again at runway 18 at National is that you are required to make so many maneuvers in close proximity to the ground. You don't have a straight-in approach procedure to fly.

So even though there are buildings at National that violate the present FAA criteria for construction, identification of hazardous and TERPS procedures, the fact that you are maneuvering under sometimes adverse weather conditions, and the fact that the particular procedures on non-precession approach to runway 18 requires you to see the runway.

And then, once you see the runway, you may descend below your minimum descent height and get into the airport. It is almost an invitation to do as much as you can to make that airport. And there are times when under cross wind conditions and stuff, that the airport is going to wander to one side or the other of the river.

Mr. GLICKMAN. Does it make you want to descend to a lower altitude in order to see that runway?

Mr. O'BRIEN. No. When you have your minimum descent altitude, when you go down and once you see that runway, though, you are by regulation allowed to descend below that altitude, and it is up to you to maintain sight of that runway or else you are going to have to execute a missed approach.

So once you are flying along the minimum descent altitude and you see the runway and start descending, your prime concentration is maintaining sight of that runway and maneuvering your airplane so that you can execute somewhat stabilized approach to that runway.

Mr. Hunt, Director of the FAA's Office of Flight Operations, and Mr. Neal Blake, Deputy Associate Administrator, responded to questions on FAR Part 77:

Mr. GLICKMAN. The ALPA pilots talked a little bit about the fact that at San Francisco International Airport there were hotels going up, not in the direct pattern, but off to the side where the turns would take place and they said that those structures would not in any way violate your particular policies right now because they were not in the direct pattern.

Is that a correct statement?

Mr. HUNT. Well, when you build a structure around an airport, we really don't have the authority to tell somebody they can't build a structure. What it actually does is that it will increase the landing minimums if it is on an approach or if it is on a takeoff. We have criteria to make turning takeoffs to miss obstructions on the end of the runway.

Mr. GLICKMAN. Let me talk about the generic question. Why are there no enforcement powers under FAR, Part 77? I guess this is the Federal Air Regulation that has to do with obstacles to airports, buildings and this kind of thing. Does anybody know?

Mr. BLAKE. I might just comment on the basic process under that regulation that where there is a community proposal to construct a building that would penetrate the safety plane that that proposal must be reviewed by the FAA.

We will comment back to them what the effect of that obstruction or new building is if, in fact, it is one. It is the community's decision what to do about it.

There are a lot of incentives, of course, for them to want to control the height of the buildings in the vicinity of the airport because you could, through improper construction, limit utility of the airport, and also affect the sponsor's ability to get insurance on his operation.

Cooperation in many cases has been extremely good and construction height has been limited and we have had the help of other agencies such as the FCC in getting some of the structure heights reduced.

Mr. GLICKMAN. But you don't have the legislative requirement then to review structures at all airports that you don't operate then?

Mr. BLAKE. Only to the extent that they violate the criteria, Part 77.

Mr. GLICKMAN. If they do violate the criteria, do you have the power to go into court to prevent the structure from being constructed?

Mr. BLAKE. No, not currently.

Mr. GLICKMAN. So what is the purpose of the requirement? Can you deny ADAP funds to that airport?

Mr. BLAKE. Well, I think what one can do—I guess the simple answer is yes, but the building will have some impact perhaps on the minimums available for an approach.

If it looks like a hazard, it will have some impact on the ability to get insurance funds or coverage for the airport.

Mr. GLICKMAN. Could you disallow the approach?

Mr. HUNT. If the building created that kind of a hazard, yes.

Mr. GLICKMAN. Well, you know it strikes me kind of interesting that local communities have gotten very concerned about noise and I know why. I live under an airport pattern, but this is probably a much more serious issue for the safety operation than the noise.

You know that in my judgment noise abatement procedures may work the other way. There is a tendency for them maybe to jeopardize the safety [illegible] people who are underneath them so we have a very mixed b[illegible]g here and I would hope that the FAA, when you are reviewing your Part 139 review, that you take a look at this issue, the obstacle issue because I think it conceivably could become a more serious one than it is now.

Mr. Robert Michael, Director of Aviation, Denver-Stapleton Airport, Airport Operators Council International, also had concerns about airport obstructions and FAR Part 77:

Mr. MICHAEL. A bit has been said earlier about Part 77 and objects affecting navigable airspace.

Airport operators have long been concerned with the height of obstructions that may be constructed near airports. Normally, the land around airports is zoned by the local jurisdiction in accordance with, or even more restrictive than, requirements established in FAA regulations.

Land owners, though, will frequently petition for zoning changes or exceptions in order to erect structures that protrude into the Part 77 restricted flight surfaces.

While we can understand the desires of land owners to increase the return on their use of land, as airport operators we must also think in terms of aviation safety.

Part 77, which has a long history, presumably was written to do this. Part 77 requires that notice of certain proposed construction or alterations be provided to the FAA Administrator.

In addition, it establishes standards for determining obstructions, and provides for FAA aeronautical studies of obstructions, local public hearings on hazardous effects of proposed construction, and FAA actions with respect to the establishment of antenna farm areas.

In the past, we feel that the FAA aeronautical studies have, too frequently, erroneously ruled proposed construction to be no hazard to air navigation.

FAA determinations of no obstructions or no hazard to air navigation are often construed at the local level as either endorsement of a proposal or as no objection to a proposed land use.

Such FAA determinations inhibit and often run completely counter to the airport's efforts to control or influence decisions that affect land use planning and the safety of aircraft operations at airports.

AOCI recognizes that the control of land use goes beyond the intent of Part 77 and that FAA will not project itself into local land use or zoning conflicts; however, the FAA's approval under Part 77 may have an adverse effect upon airport efforts to maintain local airport safety initiatives.

As a minimum FAA Form 7460–1 should be modified to eliminate the phrase "would not exceed any obstruction standard of Part 77 and would not be a hazard to air navigation."

In its place, AOCI proposes that the findings be limited to the factual determination that a proposed structure "does not violate the height restrictions of FAR Part 77."

It is time the Federal Government joins with the airport authorities, State and local governments and communities in a cooperative effort to support local zoning regulations and restrictions which are fully compatible with local airport operations.

In short, the technical criteria of Part 77 for describing imaginary surfaces and determining obstructions are reasonable. The administration of determination, though, is more than a mere technical issue.

(4) RUNWAY FRICTION RESEARCH

Congressman William Carney asked Mr. Burnett and Mr. Laynor about current runway friction research efforts:

Mr. CARNEY. How about the runway conditions program where you are measuring for friction, that type of thing? It has been suggested that the change of the friction on a runway changes so rapidly that we are wasting our time studying that. We should perhaps be studying programs to change the friction of a runway, how to clear a runway, de-ice a runway, that type of thing rather than being involved in measuring the friction to tell the pilot?

Mr. BURNETT. Well, I think we are in favor of both. We do support runway friction measurement and we support correlating the

performance capabilities of the aircraft. Some European airlines are doing that on their own already. I think generally Europe is substantially ahead of us in that area, but certainly we are in favor of better snow removal plans and the kind of research to support that.

Can you add anything?

Mr. LAYNOR. Yes, sir. I would like to add that we are strong supporters and our staff has been participating in the programs that are being conducted by NASA and the FAA in the evaluation of friction measuring devices and we support the requirements for friction measuring devices in the context of measuring the friction on a new, dry runway as well as to use it for looking at runways that are contaminated with moisture or snow.

We believe it is essential for maintenance, as Mr. Loeb has mentioned. As the runway is used, the rubber deposits and buildups on the runway destroy the friction which can be developed on that surface. We think periodic evaluation of the runway surface used in these types of equipment is necessary.

Further, we would like to get into the area, and we think it is possible we could get into the area to use it for operational purposes to be able to determine when it is necessary to close a runway for cleaning or close an airport, for that matter, based on the actual performance of the airplane.

Mr. O'Brien expressed ALPA's support for current FAA-NASA research programs on runway friction correlations:

Mr. O'BRIEN. After briefly describing some of the problems, I would like to acknowledge the fact that FAA does have work underway in some of these areas that have improved the margin of safety for air operations. One of the more promising efforts is a joint FAA-NASA program, the runway friction measurement program.

First, adequate emphasis and funding must be provided for the continuation of the FAA runway friction measurement program. As this effort moves toward measurement of actual airport stopping performance and compares this with the runway conditions identified with the various friction measurement devices, what we are talking about here primarily is funding. As this program moves along, it will become more expensive to support.

In fact, we have spent an awful lot of time and effort making sure that that program got started and making sure that all those people who should be involved in the program did, indeed, participate in developing the criteria under which we are going to operate the program.

We have some concern now, though, that the program be properly funded and adequate resources be made available for the program. We have done an awful lot of work.

We have got a lot of data out of the program already but, for example, this year I think there is $400,000 allocated to the program. For something as important as this program is, and as fruitful as it could be, we sure feel that more than $400,000 should be allocated. It is going to require more than that when we get into actually testing some aircraft.

I know Lockheed has suggested that it would make the 1011 available to NASA and FAA to do some actual correlation between

the various friction devices and actual stopping devices, but once you get into aircraft testing, that is an expensive proposition.

Mr. CARNEY. I fully appreciate that.

My next question has to do with the same friction program. It has been said that conditions change so rapidly that it would be impossible to give you good data as a pilot approaching an airport.

Do you think that might have an adverse effect on your ability to understand the present conditions?

Mr. O'BRIEN. Obviously I can't sit here and tell you that conditions don't change very rapidly. They do.

In that case, probably the best information we can get, then, is on the pilot reports, preceding aircraft. However, there is lack of standardization and that kind of information today. A lot of it is subjective.

If we had a better understanding as to how various airplanes perform under certain conditions and we can get this to this program we talked about here, then the report of an L–1011 pilot or a DC–9 pilot would mean much more to me, following that particular aircraft flying.

Again, it is good information and conditions are changing, but we can do a lot to improve that information.

Mr. CARNEY. Having the information is only good if you know what to do with it, I guess is what you are saying.

And by continuing to study the performance of various aircraft under different runway conditions would allow you, as an incoming pilot, to adjust with some intelligence by saying, well, we know that L–1011 will respond this way to this type of surface. So I make my adjustment. That type of information would be timely because you would be getting it from pilots in front of you coming in.

Mr. O'BRIEN. You have captured the situation adequately that today some airlines do have recommended procedures for pilots to use depending upon friction measurement information.

Some airports do provide this information, but again, today it is not standardized and it is rather subjective. We would just like to make it a little bit more precise so we can do this to this program.

Mr. CARNEY. Thank you.

Mr. Neal Blake, Deputy Associate Administrator for Engineering and Logistics, Federal Aviation Administration, outlined the status of the FAA's runway research programs:

Mr. BLAKE. A related problem is the effect that ice, snow, or slush on runway surfaces have on the braking performance and directional control of aircraft. At the present time, there is no adequate method of establishing a correlation between ground vehicle measurements of runway conditions and aircraft performance.

Numerous variables associated with the aircraft, runway surfaces and weather conditions all interact to make this a difficult problem.

Hence, over the past decade, FAA has encourged and supported the application of runway surface treatments to reduce hydroplaning and improve aircraft braking and directional control on wet and slippery runways.

Grooving and use of porous friction courses are the two primary surface treatments in use. Additionally, information has been dis-

seminated on the design and maintenance of the runway surface to assure effective aircraft tire traction.

Friction measuring equipment is being studied for use in runway maintenance and airport operations.

The condition of runways can be monitored for maintenance purposes by taking periodic measurements on dry runways with friction measuring devices that apply water to the pavement at a controlled rate.

The result is an indication of the slipperiness of runways under wet conditions and it is generally accepted that several friction measuring devices are available which can differentiate between good and bad pavement surfaces. Correlation among devices is being determined by extensive testing.

The establishment of operational criteria is a far more complex problem than establishing criteria for runway maintenance because of the many variables which are involved in relating friction numbers from measuring devices to aircraft braking performance.

A current NASA program is addressing this area.

Another aspect of FAA's runway research concerns the characteristics of the pavement itself. The thrust of this program is to develop improved design, maintenance, evaluation, and construction techniques that could result in stronger, more durable, and less expensive airport pavement.

Mr. Chip Mudd, Director of the Federal Aviation Administration's Office of Airport Standards responded to questions on runway friction research:

Mr. GLICKMAN. What about the correlation research now underway?

Mr. MUDD. I am referring to correlation between the friction measurement and the study which you are referring to has to do with equating the friction measurement instruments to aircraft and that is continuing.

Mr. GLICKMAN. Do you have any idea? Where is the state of the research right now? How long a program are we talking about?

Mr. MUDD. Well, we did some limited tests two weeks ago in Atlantic City and more is planned, I think, next winter under snow conditions, but as I visualize this, it will be a very long, drawn-out affair and I would not want to hazard a guess.

Mr. GLICKMAN. Okay. I would conclude by saying I believe this is a high priority in terms of this committee. We had joint hearings with Mr. Gore's subcommittee last year where we talked about this issue, as well.

The whole issue of friction, snow, ice, lack of knowledge to pilots. I just want to reemphasize our concern with it.

Mr. Michael, speaking for the Airport Operators Council International, was skeptical about runway friction measurement research:

Mr. MICHAEL. For over a decade, the FAA, and later NASA, have been investigating the merits of friction measuring vehicles. The results to date have not been conclusive.

There has been similar activity overseas. In 1982, FAA embarked on a program of evaluating various friction measuring devices to develop a data base on contaminated—snow, ice, sleet, freezing, even rubbers—runways.

Airport operators have not yet been greatly aided by friction measuring device technology—Mu-meter, Skiddometer, Saab and Diagonal Braking Vehicles are examples—to determine whether snow- or ice-covered runways will provide adequate braking action during lands.

Few, if any, airports use just these devices for determining runway conditions during snow or icing conditions.

I mean to emphasize that few of them use those devices only in that determination.

In our view, such friction measurement information only supplements data gathered from other sources, such as the Snow Removal Committee, an experienced operations supervisor or field maintenance personnel.

Mr. F. Russell Hoyt, Executive Vice President, American Association of Airport Executives, spoke on runway conditions:

Mr. HOYT. Now, as to runway conditioning and condition reporting, these are the direct responsibility of airport management. It is our job to clean the runways and other operational areas to the best condition that man and machines will permit. However, as this is not always possible, then to inspect and report as accurately as possible what the runway conditions are.

Unfortunately, snow removal and ice control is a very inexact science. There are many variables in the winter operations equation: snow type, wet or dry, temperatures, dewpoint, wind, duration of precipitation, storm direction and time of day. They combine to make snow removal or ice control more of a "seat of the pants" operation and application of practical experience rather than a scientific exercise.

We believe that airports do a credible job in keeping airports operational but we need help in this area. Perhaps we are about at the limit in terms of utilizing machines that either blade, brush or blow snow. Research needs to be brought to bear on the problem.

As we stated before, these are the direct responsibilities of airport management. But beyond the cleaning, assessing and reporting of runways, there is a serious question of the aircraft's ability to safely land and stop given the existing runway conditions.

It is here, I think, that we should point out that we should not be expected to judge whether an aircraft of a certain type with a given gross landing weight at a known speed can safely decelerate and stop on a runway of a given length with a certain wind direction and velocity. We are not qualified to make that decision.

Airport management believes and practices the policy that it is its responsibility to operate a safe airport and it is the FAA's role to check and see that this is done. What airport management needs is not more regulation but more assistance in the how-to category. R&D efforts could well be directed to such areas as friction measurement and correlation to aircraft breaking, snow removal and ice control.

IV. AVIATION SAFETY RESEARCH PROGRAMS

The Honorable J. Lynn Helms, Administrator of the Federal Aviation Administration, outlined his general plans regarding FAA aviation safety activities:

Mr. HELMS. In the spring of 1981, I laid out for the FAA four long-term programs and plans going to the end of the century. The first was the national air space system plan, which had to do with equipment. The second was the national air space review. How do we more properly use this cubic volume of air over the earth? Third was a system of integrated airports to improve the capacity and uses of airports. Fourth was an advanced R&C program leading to the support of the first three, identifying those other problem areas which should be pursued. Within that R&D program, then, it is broken down into numerous sections of which one section is cabin safety.

Cabin safety then is broken down into the six elements which I have identified on this chart so that members of the committee could see that today we are talking one segment of one portion of the R&D program, which is one of four major plans for the FAA. This plan is laid out on the basis of crashworthiness; antimisting kerosene; interiors; what we refer to as the control impact will be a combination of many other items; evacuation; finally, the supporting systems.

Mr. CARNEY. Mr. Helms, you laid out much of that schedule to this committee back in 1981. I would just want to say that for the record.

Mr. HELMS. I would be remiss, Mr. Carney, if I did not compliment the committee because when I laid out the program in 1982 we had $80.8 million of R&D funds. The committee provided over a 50 percent increase. We went to $121.2 million in 1983. I laid out what I wanted for 1984 to the committee, and it was more than doubled to some $280 million and the committee supported that. So the progress we have made is basically because of two items. We laid out a good sound detailed systems engineer plan in early 1981, and this committee supported it.

Congressman Bill Carney discussed the cooperative efforts of the FAA, NASA and the aviation industry on aviation safety research with Dr. Raymond Colladay, Deputy Associate Administration of NASA, and Mr. Allan Tobiason, NASA's Program Manager for Aviation Safety Technology:

Mr. CARNEY. My final question is one having to do with the interaction between NASA, FAA, airline industry. Are you comfortable and confident that we are doing the best we can to get information from one agency to the other, to get technologies from one agency to the other? Obviously, NASA is the lead agency when it comes to dealing with the new technologies. But are we getting them down into applied fields rather than just into the programs supported by NASA.

Mr. TOBIASON. I think, sir, we could be looked on very well here because it is a standard NASA tradition to be involved heavly with industry, airframers, power plant people and materials and chemistry people. I think that is a strength of our program. We all participated on the SAFER committee. NASA was on both the executive and technical committees. We participated extremely closely with the industry, test people, ASTM, National Bureau of Standards, all the people we could look for for test methods and procedures because of their involvement with other fire problems.

We have had grants with universities, contracts with the major airframers and chemical suppliers. It's been a rolled-up-sleeves, hard working group the last hhree years. We have had periodic meetings and conferences with the industry and the aviation community. To cite a few, we had a very large conference at the Technical Center in February 1981. The next month we had a large seat conference on fire-blocking layers at Johnson Space Center. We publish a lot of reports. The industry, in fact, had taken our reports and made reports of them. Aerospace Industy Association has compiled our reports and written a report which speaks very favorably of the fire-blocking layer. So I think, in sum, we have worked very closely with the industry. They have very, very unique facilities just like we do.

The cabinfire simulator at Douglas, some of the test work at Boeing and Lockheed, I think it has been a very well-integrated, will-thought out and well-hustled program over the last three years.

Mr. COLLADAY. Government and industry have learned collectively the important process of scale testing and economic evaluation that links design, material selection, and test methods. This cooperative process has established a credible information base from which to support important implementation decisions for enhancing air crew and passenger safety. Such safety efforts will continue to be an important area of NASA's efforts.

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